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ABSTRACT

One purpose of education is that of human-resource development--to provide society with the critical mass of intellectual capital and competent work forces. This paper presents an analysis of the emerging global context and school restructuring in industrialized nations. It also describes an evaluation conducted by the Education Committee of the Organisation for Economic Co-operation and Development (OECD) to illustrate the need to co-create competitive global city-states. The paper then discusses a world-class, full-service, caring and learning system and identifies innovative projects funded by the New American Schools Development Corporation. A proposal is made that the Greater Philadelphia Area City-state (GPAC) create a Leadership-Human Resources Development Academy as a form of third-wave re-engineering. Examples of strategic thinking that must occur if a region is to enjoy a better quality of life in the 21st century are presented. Educators must develop "new habits of heart and mind" and become third-wave transformational leaders. Numerous handouts are included. Contains approximately 75 references. (LMI)

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ED 384 993

NEW HABITS OF HEART AND MIND

"THIRD WAVE" TRANSFORMATIONAL LEADERS

Creating Solution Based Learning
focused on
Children and Families
and
Math, Science, and Technology
in the Era of Smart Homes,
Wired Communities, Fast Systems, Global Networks,
and Fast Forward Learners in a Borderless World

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by

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EA 026 894

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National Ed.D. Program for Educational Leaders
Summer Institute
1995

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ABSTRACT AND OVERVIEW

Between now and the year 2000, educators, community leaders, and policy makers in the United States will face challenges and make decisions that will determine the quality of life for a majority of Americans in the first half of the 21st century. An ultimate purpose of education is human resources development -- to provide society with the critical mass of intellectual capital and competent workforces to function culturally, socially, economically, technologically, and politically in the world of which each is a part. To accomplish that ultimate purpose, leaders implement planning processes to (a) guide policy-making, (b) develop institutions, and (c) allocate resources.

People are surrounded with technologies, undreamed of a generation ago, which make it possible to transmit data, voice, and video instantaneously almost anywhere in the world and simultaneously in several different languages. Although these technologies are becoming commonplace in business and are sometimes available to children in homes, they remain largely unavailable in traditional education. Without access to the latest contemporary technology, a learner is receiving less than a complete education. Global competitiveness is providing impetus for collaboration and strategic alliances for the development of competencies and skills beyond those available in traditional education.

Numerous issues will be important in the years ahead. No issue will be more important, however, than educational institutions "learning to learn" to apply the best research to the science of co-creating more effective and efficient approaches to achieve better equal access to higher quality programs at a more reasonable cost through technology.

This paper presents an analysis of the emerging global context, the restructuring in the industrialized nations, and an analysis made by the Education Committee of the Organisation for Economic Co-operation and Development (OECD) as a prelude to indicating the need to co-create competitive global citystates. It then discusses a world class "full service" caring and learning system and notes break the mold projects funded by the New American Schools Development Corporation (NASDC). This background is then applied to the emerging Greater Philadelphia Area Citystate (GPAC) to illustrate the type of "third wave" re-engineering which is necessary in a "Keystone" state that played a significant role in previous revolutions in the history of the United States. Specific examples will be presented of the type of strategic thinking that must occur if a region is to enjoy a better quality of life in the 21st century. Educators must develop "New Habits of Heart and Mind" and become Third Wave Transformational Leaders.

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THE GLOBAL CONTEXT

The United States became pre-eminent during the industrial era. Immediately after World War II, the U.S. had the biggest market in the world and generated 75% of the World's Gross Product (WGP) which was almost eight times as large as the rest of the world. The U.S. was wealthier than any other nation. In the 1950s, the U.S. had a per capita income twice that of the next country and eight times that of Japan. The U.S. could afford to do large scale projects that other countries could not undertake. U.S. citizens could afford goods and services that people in other countries could not purchase.

A great deal of the U.S. pre-eminence was attributable to the investment in research and development, evolution of planning and management know-how and technology, and research universities that produced intellectual capital. During and immediately after WW II, the U.S. created the largest R & D infrastructure in the world. Investment in the scientific establishment by the federal government and the private sector was unparalleled in the world. Product development required new ways of planning, managing, and evaluating the continuum extending from nurturing of ideas through production, distribution, and service of goods. Advances in science and technology increased in complexity.

Major expansion occurred in the 1950s and 1960s in all sectors of the economy, particularly manufacturing and services. Rapid advances in science and technology yielded global competition and modernization at an accelerating rate. Establishments that survived, modernized with new technology in the 1970s and early 1980s.

Pennsylvania was a world class leader during the industrial era, primarily because of natural resources such as anthracite coal and the infrastructure to produce steel. The collapse of big steel is an example of the failure to invest in new technology as well as deal with bureaucracy and productivity through human resources development. Between 1974 and 1986, 337,552 jobs were lost and brought the death of Pittsburgh's Monongahela Valley as America's steel capital (Hoerr, 1986).

During the 1980s, it became apparent that modernization of industrial era establishments was necessary, but insufficient. The surviving manufacturing sector establishments modernized several times with contemporary technology and then began to restructure. More important, however, a few establishments began to recognize the centrality of HUMAN RESOURCES DEVELOPMENT (HRD) committed to Total Quality with world class Benchmarking Standards.

As the U.S. entered the 1990s, most of the above-mentioned and other advantages had disappeared. The U.S. had gone from 75% of the WGP in 1945 to less than 25% of the WGP in 1989. Manufacturing was particularly hard hit as can been seen in the decline of phonographs, color televisions, computer numerically controlled machines, and aircraft (see Attachment 1). With regard to per capita purchasing power, the U.S. is now only the ninth wealthiest country having been surpassed by Austria, Denmark, Germany, Japan, Norway, the Netherlands, and Sweden.

Three major areas are emerging in a new world economy. The European Union has 350 million people in 12 nations with a per capita income larger than that of the U.S.; The EU is moving toward integration. The North American Free Trade Agreement has a total population of 320 million people in Canada's 10 provinces, Mexico's 32 states, and the 50 U.S. states. The most dynamic region of the world is the Pacific Rim. The Republic of China (ROC) is currently the fastest growing economy. ROC has 22% of the world's population and has the fastest growing and largest middle class of people who want to buy products made by Western countries. Three-quarters of the economic opportunities are located outside the U.S. Furthermore, Western democracies will have a decreasing share of the world's population, dropping from 22% in 1950 to 15% in 1985, and to 9% in 2020.

The Organisation for Economic Co-operation and Development (OECD) has developed a uniquely internationally-comparable data base of indicators for sector analysis. The indicators for 13 of the 24 member nations cover five broad areas of manufacturing performance: business enterprise research and development; investment; international trade; employment; and production. Trends from an OECD study are
- The pre-eminence that the U.S. enjoyed across a wide variety of sectors has declined over the past two decades, but the U.S. still enjoys a considerable lead in many sectors, particularly the high technology industries.
- Where the U.S. has lost ground, it has usually been Japan that has gained. In many cases these gains have been broad-based, emanating from technology sectors.
- As Japan has gained, the European Community countries that were studied have seen the erosion of their position.

The globalization of the world economy is causing all nations to analyze human resources development policies and systems. Education, K through postgraduate, and training will be modernized and restructured through (a) internal initiatives and/or (b) forces external to the enterprise. The OECD Education Committee completed a three year analysis of "The Changing Role of Vocational and Technical Education and Training" (OECD). The nations that co-create a clear vision of the future and re-engineer education will be more competitive and enjoy a higher quality of life.

U.S.'s WORLD SHARE

	1970	1987
Phonographs	90%	1%
Color Televisions	90%	10%
Computer Numerically Controlled Machines	100%	35%

Turning to Technology. Southern Growth Policies Board, 1989, p.7.

U. S. AIRCRAFT MANUFACTURING WORLD MARKET SHARE

1969	91%
1993	67%

FAR EAST P.R. JAPAN	CANADA U.S. MEXICO	EUROPE E.C. GERMANY

GLOBAL COMPETITIVENESS

	NOW	2000
GLOBAL REGION	EARLY TECHNICAL ERA	ADVANCED TECHNICAL ERA
EUROPEAN COMMUNITY		
NORTH & SOUTH AMERICA		
PACIFIC RIM		

Co-creating Competitive Global Citystates

The Greater Philadelphia Area could become one of the world's great citystate regions in the 21st century (Peirce and Johnson, 1995). The Greater Philadelphia Area Citystate (GPAC) is a region based on the composition of its economy and the infrastructure. Some people perceive the GPAC as the counties of the Delaware Valley Planning Commission. Other people perceive the GPAC as the region extending from Atlantic City to Harrisburg. The merger of the Technology Council of Greater Philadelphia (TCGP) with the Technology Council of Central Pennsylvania (TCCP) to form the Eastern Technology Council (ETC) is recognition that the GPAC could extend to Center County and the nearby surrounding counties. However the GPAC is perceived, an important consideration is how the region will develop in the emerging global economy. How do you envision the GPAC evolving during the next five years? What are the implications for human resources development? For pre K through postgraduate education, what are the implications for curriculum content and format, delivery system formats, and student learning outcomes assessment? For the health care system and social service agencies, what are the implications for the delivery of a continuum of programs extending from health education and wellness promotion through tertiary rehabilitation?

Economic and Technological Variables

The Census Bureau collects information about employment outlook using ten major categories, four of which are labeled goods (agriculture, mining, construction, and manufacturing) and six of which are services (finance, government, transportation and utilities, self-employed, wholesale and retail, and services). The ten categories of economic establishments are a composite of many types of businesses including manufacturing (#4) and services (#9). Two areas in manufacturing that are essential to the viability of the U.S. are **#8 printing and publishing** and **#9 electric and electronic equipment** (see Attachment 3). Data are collected in years ending in a "2" and a "7."

Advances in research and development drive an economy. The private sector invests several times the amount of money in research and development that is invested by the federal government. The U.S. Government funds over 600 research and development (R & D) laboratories to advance science and technology in agriculture, education, health, military and space, and other fields. Technology Transfer (TT) from R & D Centers began to accelerate in the 1980s. R & D and TT are being focused on the National Information Infrastructure (NII). Technological variables are not classified in a manner such as economic variables. Some technologies apply to all establishments such as communication and information technology. Communication and information technologies are

ECONOMIC ESTABLISHMENTS

1. Agricultural services, forestry, fisheries
2. Mining
3. Contract construction
4. Manufacturing
5. Transportation & public utilities
6. Wholesale trade
7. Retail trade
8. Finance, insurance, real estate
9. Services
10. Non-classified

MANUFACTURING (#4) ESTABLISHMENTS

1. Food & Kindred Products
2. Tobacco
3. Textile Mill Products
4. Apparel & Other Textile Products
5. Lumber & Wood Products
6. Furniture & Fixtures
7. Paper & Allied Products
8. Printing & Publishing
9. Chemical & Allied Products
10. Petroleum & Coal Products
11. Rubber & Misc. Plastic Products
12. Leather & Leather Products
13. Stone, Clay & Glass Products
14. Primary Metal Industries
15. Fabricated Metal Products
16. Machinery, Except Electrical
17. Electric & Electronic Equipment
18. Transportation Equipment
19. Instruments & Related Products
20. Miscellaneous Manufacturing Industries
21. Administrative & Auxiliary

SERVICES (#9) ESTABLISHMENTS

1. Hotels & Lodging Places
2. Personnel Services
3. Business Services
4. Auto Repair Services
5. Miscellaneous Repair Services
6. Amusement & Recreational Services
7. Health Services
8. Legal Services
9. Educational Services
10. Social Services
11. Museums, Botanical, Zoological
12. Membership Organizations
13. Miscellaneous Services
14. Administrative & Auxiliary

essential to everyone because of the relationship to literacy, productivity, and democracy. The information explosion has gathered force over the past 40 years. Creating "intelligence" via computer and dissemination by communication and information technologies are the classic tools for creating wealth (Wriston, 1992). Technologies are fundamentally changing the way communications occurs.

Ponder the following advances in technology:
In 1955, it was hand set type and the platen press.
In 1981, it was the PC.
In 1985, it was desktop publishing.
In 1989, it was voice activated technology and desktop presentations with sophisticated graphics.
In 1993, it was voice activated typewriters and electronic books.
In 1994, it was continuous voice activated desktop multilingual videoconferencing which helped to minimize geographic, language, physical and temporal restrictions.
In 1995, it was asynchronous transfer mode (ATM) technology with continuous voice activated software on a PC using cellular-wireless communications technology to access databases through local area and wide area networks.

The U.S. Government is helping the private sector with the competitiveness through several programs including the (a) Research & Development Laboratories, (b) Advanced Technology Program (ATP) of the National Institute of Standards and Technology (NIST) and (c) National Information Infrastructure (NII) through the National Telecommunications and Information Administration (NTIA). There are at least 36 vendors producing ATM technology. ATM technology is being used by hundreds of corporations for global policy making, marketing and production, and for training.

Jobs

A Standard Industrial Classification (SIC) system is used to analyze number and types of jobs by the Bureau of Labor Statistics (see Attachment 4). BLS uses historical data with a series of variables to project changes in employment outlook. Although national trends are rather accurate, regional and state profiles are dependent on local variables. The integration of technology as well as the rate of change will accelerate in the future. Downsizing, restructuring, and rightsizing of functions, jobs, and entire industries will occur in several waves in the future.

Now try to anticipate advances in the next five years.
In 1996, it will be....
In 1997, it will be....
In 1998, it will be....
In 1999, it will be....
In 2000, it will be....

STANDARD INDUSTRIAL CLASSIFICATIONS (SIC)

01-0 Agriculture
07 Agricultural services
08-09 Forestry and fishing
10-14 Mining
15-17 Construction
20-39 Manufacturing
40-49 Transportation, communications, & utilities
50-51 Wholesale trade
52-59 Retail trade
60-67 Finance, insurance, and real estate
70-89 Services
91-97 Public administration
99 Nonclassified

MANUFACTURING

20 Food & Kindred Products
21 Tobacco Manufacturing
22 Textile Mill Products
23 Apparel & Other Textile Products
24 Lumber & Wood Products
25 Furniture & Fixtures
26 Paper & Allied Products
27 Printing & Publishing
28 Chemicals & Allied Products
29 Petroleum & Coal
30 Rubber & Plastic
31 Leather & Leather Products
32 Stone, Clay, Glass, & Concrete Products
33 Primary Metal Industries
34 Fabricated Metal Products
35 Machinery, Except Electrical
36 Electrical & Electronic Equipment
37 Transportation Equipment
38 Instruments & Related Products
39 Miscellaneous Manufacturing Industries

SERVICES

70 Hotels, Rooming Houses, Camps, & Other Lodging Places
72 Personal Services
73 Business Services
75 Automotive Repair, Services, & Garages
76 Miscellaneous Repair Services
78 Motion Pictures
79 Amusement & Recreation Services, Except Motion Pictures
80 Health Services
81 Legal Services
82 Educational Services
821 Elementary & Secondary Schools
822 Colleges, Universities, Professional Schools, & Junior Colleges
83 Social Services (Census Only)
84 Noncommercial Museums, Art Galleries, Botanical & Zoological Gardens (Census Only)
86 Membership Organizations (The Census excludes 863, labor unions & similar organizations, 865, political organizations, & 866 religious organizations; the annual survey excludes SIC 86 entirely.)
89 Miscellaneous Services (Census Only)

ADVANCES IN TECHNOLOGY

In 1955, it was hand set type and the platen press.

In 1981, it was the PC.

In 1985, it was desktop publishing.

In 1989, it was voice activated technology and desktop presentations with sophisticated graphics.

In 1993, it was voice activated typewriters and electronic books.

In 1994, it was multilingual continuous voice activated desktop videoconferencing which minimizes geographic, language, physical and temporal restrictions.

In 1995, it is asynchronous transfer mode (ATM) technology with continuous voice activated software on a PC using cellular communications technology to access **databases** through local area **networks** (LANs) and then to wide area networks

ADVANCES IN TECHNOLOGY (con't)

In 1996, it will be . . .

In 1997, it will be . . .

In 1998, it will be . . .

In 1999, it will be . . .

In 2000. it will be . . ..

WORLD CLASS LEARNING SYSTEMS (THE IDEAL)

Changes in societal learning systems have been evolving over the years. Advances in research and development, rapid technology transfer, global competitiveness, and the failure of contemporary traditional education at many levels caused Corporate Classrooms (Eurich, 1985) to evolve into industry degree granting colleges and universities which use the latest in contemporary technology. Motorola Inc., which received the first Malcolm Baldrige National Quality Award in 1987 under Public Law 100-107, operates Motorola University in Schaumburg, IL, and Motorola University West in Phoenix, AZ, which delivers training programs to Central and South America and the Pacific Rim. Motorola achieved another milestone on the way to becoming the premier global employer by receiving the Secretary's Opportunity Award in 1993, the highest honor from the U.S. Department of Labor. The National Quality Award program is administered by the National Institute of Standards and Technology of the U.S. Department of Commerce. The program initiated pilot evaluations in healthcare and education beginning in 1995.

The Office of Science and Technology Policy of the Office of the President is promoting a "Communications Age Learning System." Community Learning and Information Network (CLIN) is a national effort with state affiliates. Other national projects are developing conceptual frameworks and multi-year action plans to use contemporary technology for economic development and human resources development.

Several state level projects have emerged. Iowa began a distance education technology-based system in 1989, followed by Georgia in 1992, Kentucky, Maryland, and North Carolina in 1993 (McFadden, 1995). North Carolina's plan calls for use of ATM technology in 58 high schools, 18 community colleges, and 16 campuses of the UNC.

Electronic villages and freenets are emerging. Smart Valley, Inc. in California's Silicon Valley is creating a 21st century community that will encompass the nine county San Francisco Bay Area. CommerceNet is a consortium of 80 companies that is conducting a large scale market trial of electronic commerce via the Internet. Smart Valley Schools Internet Project is directed at bringing information technologies to elementary, middle, and secondary schools and eventually into the community and home (Markus, 1995).

What principles for caring and learning communities are important to consider in creating a conceptual framework for your context? What specifications for caring and learning communities are necessary to include in a multi-year action plan? What **NEW HABITS OF HEART AND MIND** must be nurtured through planned **HUMAN RESOURCES DEVELOPMENT**?

The Changing Educational Paradigm

This section will discuss the emerging knowledge-based education paradigm. The knowledge base is presented for preparing third wave transformational learners and workers, some of whom will become third wave leaders.

Knowledge-Based Education Paradigm

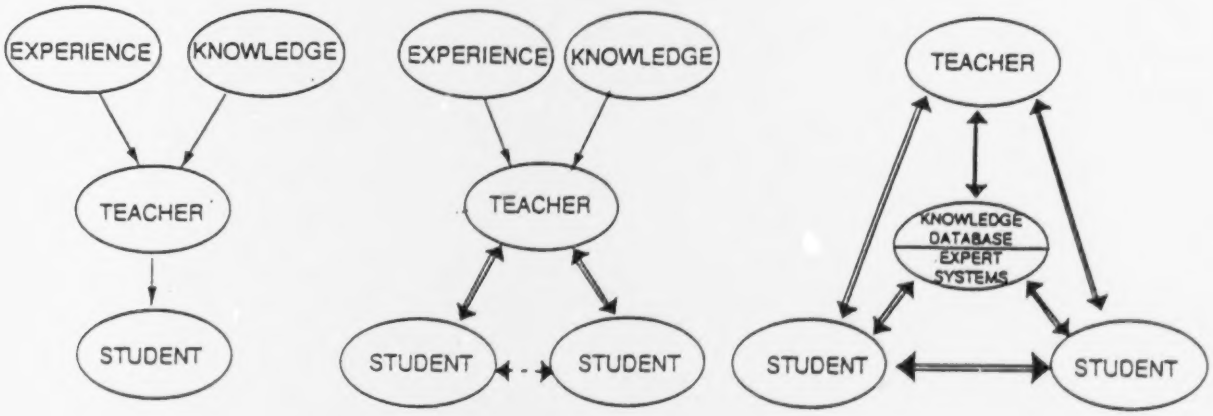
Curriculum has three formats: content format, delivery system format, and evaluation format. **Content format** reform involves voluntary standards in core subjects and 22 occupational skills projects. **Delivery system formats** began to become technology intensive in the 1980s. Imagine completing an undergraduate degree through your PC at home or at work as early as 1986. **Evaluation formats** have expanded to include "authentic" and self growth assessments. A knowledge-based problem-solving format is emerging from the application of state-of-the-art know-how and technology. New American School Development Corporation (NASDC) projects are attempting to develop new education paradigms and disseminate that know-how. At the two-year college level, the League of Innovation in the Community College and Jones Educational Networks formed a partnership to form the International Community College which will use cable, computer technology, satellite and wireless technology to create a 21st century learning paradigm.

Dr. Robert K. Branson (1990) has pioneered the changing educational paradigms. School-based student learning was dependent upon a teacher-focused paradigm which was often discipline-centered and textbook driven. A limited range of know-how and technology has yielded the current paradigm. One critical issue is how to better manage contemporary traditional education while designing new world class systems which can yield better effectiveness and efficiency. Terrence Overlock (1995) is developing a multi-year plan for the integration of multimedia technology into the learning environment at Northern Maine Technical College (NMTC), an institution with cooperative tech prep programs with 36 schools in the Northeast one-third of the state.

Education has merely grafted a first wave of technology onto traditional education. The first wave of technology will be followed by other more complex integrated technology that should become integral to the learning process, not just a graft. Few leaders are adequately prepared for re-engineering contemporary traditional education, for creating new "full service" more effective learning systems, or for the first wave of restructuring that is currently occurring. Two critical issues are (a) how to help current practicing managers adjust to changing circumstances and (b) how to prepare "Third Wave" Transformational Leaders for future waves of technology and the necessary re-engineering.

Figure 1

Schooling Models of the Past, Present, and Future



A
ORAL TRADITION PARADIGM

B
CURRENT PARADIGM

C
TECHNOLOGY-BASED PARADIGM

Branson, R. K. (April, 1990). Issues in the Design of Schooling: Changing the Paradigm. Educational Technology, pp. 7-10.

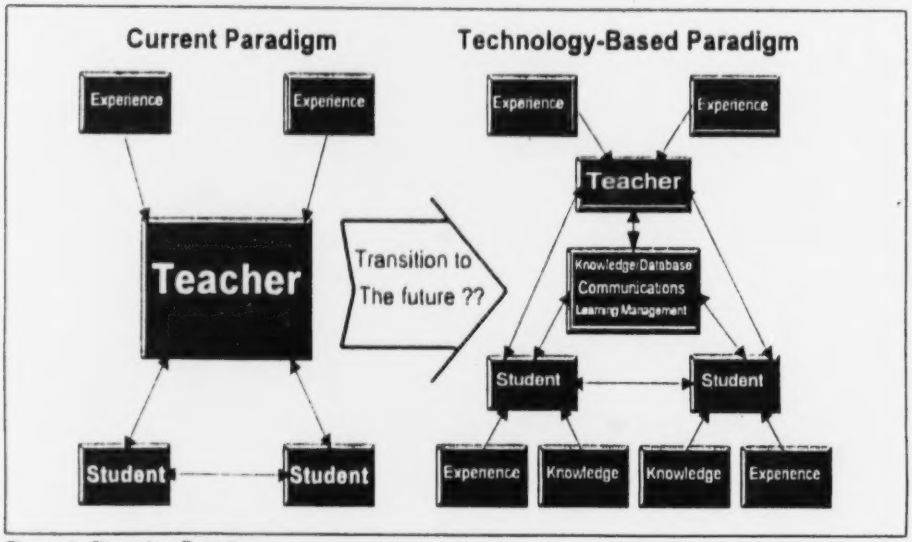


Figure 1. Changing Paradigms

Note: Adapted from Branson, R. K. (April, 1990). Issues in the design of schooling : Changing the paradigm. Educational Technology, 30, 7-10

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Knowledge Base for Transformational Leadership

The University Council of Educational Administration (UCEA) recognized the need for a conceptual framework to help guide upgrading of graduate programs in administration. Understanding, Attitudes, Skills, and Symbols: Leadership in the Future (Cunningham and Payzant, 1983) synthesized basic research and identified program competencies for leaders. Other documents were analyzed to create leadership seminars in two doctoral programs and for workshops on "Leadership for Innovation and Change" (Groff, ED 335 519, in Appendix). Essentially, the research indicates that leadership consists of the competencies to create and co-create a vision with others and then to transform that vision into a multi-year action plan with organizational development (OD) and human resources development (HRD) components.

Leadership and human resources development begins with an understanding of "self." Infants begin life with some programming which is nurtured through culture and experience and leads to preferences and styles. The Kolb, Myers-Briggs Type Indicator, and other tests are useful to understand human variability relative to "inputting" ideas to begin to create conceptual frameworks or alternative scenarios.

Humans and systems are similar in that both input, process, and output information, like client/server roles. Leadership content involves an understanding of societal problems, leadership competencies and skills, the dynamics of change, strategic planning, organizational development, human resources development, powerful thinking, and professional development. Transformational thinking can be based on the research on reframing, mindfulness, holistic thinking, creativity, cybernetic thinking, systems thinking, chaos theory, and military strategy. Preference for input and processing is evident in the Kolb or Myers Briggs tests.

Visioning has both content and process. The content includes beliefs, values, mission, purpose, conceptual frameworks, research, and practice. The process includes creation in self, co-creation between people with similar predispositions, co-creation among people with dissimilar predispositions, etc. Visioning should yield a future "pull" conceptual framework to which purposeful human activity can be linked. A "full service" environment must first be envisioned and shared before it can be achieved. A curriculum to produce a "High Performance Learner and Knowledge Worker" with learning modules delivered through a computer-based distance education format with some, perhaps most, sessions online must first be envisioned before a multiyear action plan can be specified with OD and HRD components to make it become a reality. Gappert planning styles yields insights about visioning content and process.

LEADERSHIP

SOCIETAL PROBLEMS

LEADERSHIP

STRATEGIC PLANNING

ORGANIZATIONAL DEVELOPMENT

AND

HUMAN RESOURCE DEVELOPMENT

POWERFUL THINKING

PROFESSIONAL DEVELOPMENT

TRANSFORMATIONAL THINKING

REFRAMING

MINDFULNESS

HOLISTIC THINKING

CREATIVITY

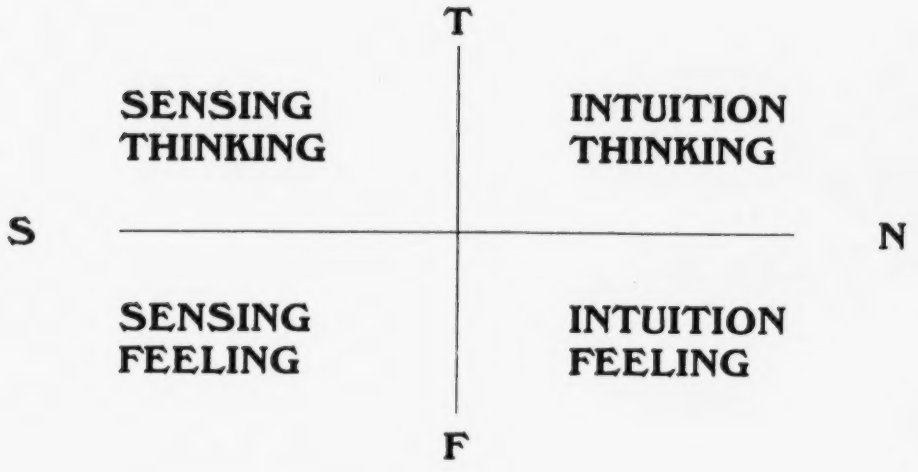
CYBERNETIC THINKING

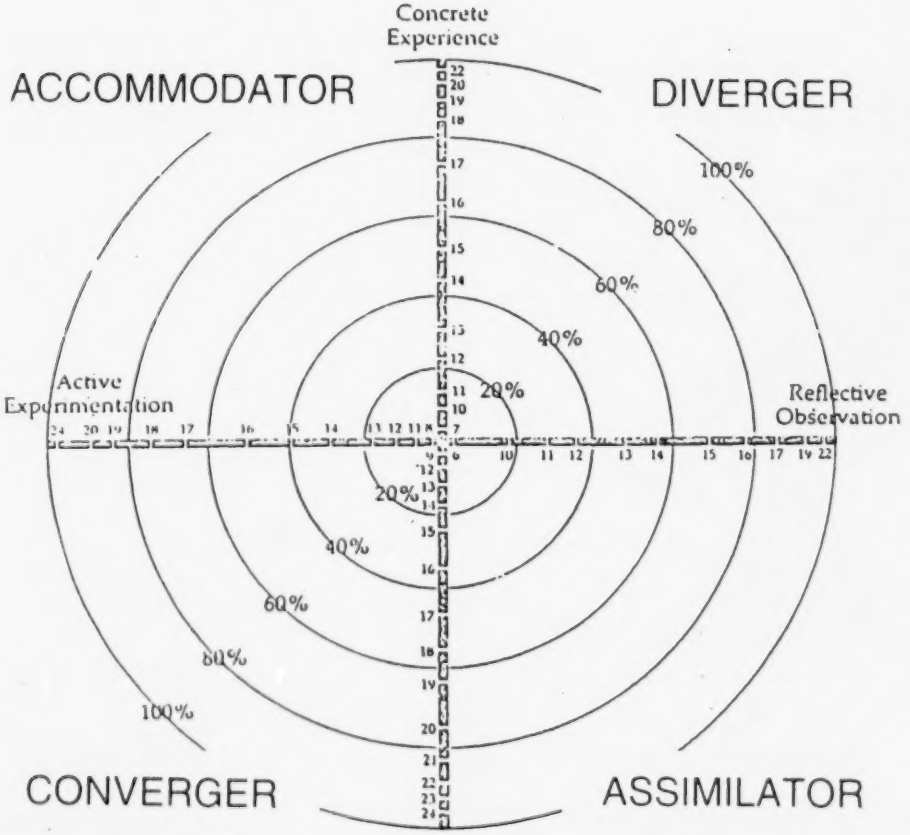
SYSTEMS THINKING

CHAOS THEORY

MILITARY STRATEGY

MYERS-BRIGGS TYPES





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VISIONING

CONTENT

BELIEFS, VALUES

MISSION, PURPOSE

CONCEPTUAL FRAMEWORKS

RESEARCH, PRACTICE

PROCESS

CREATION WITHIN

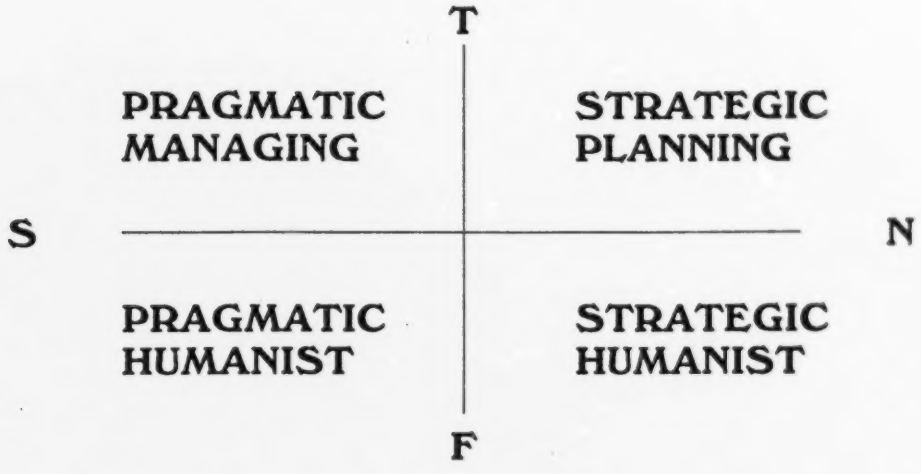
CO-CREATION BETWEEN

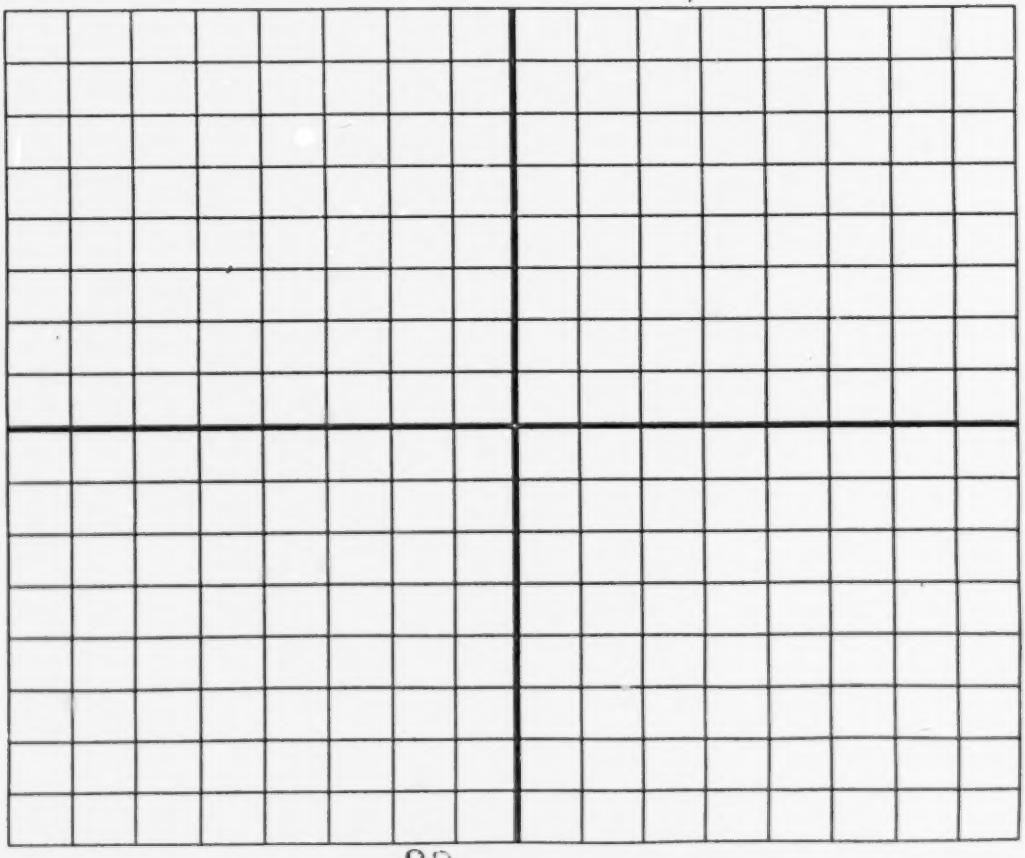
CO-CREATION AMONG

TRANSFORMATIONAL II

FUTURE "PULL"
MIND & SYSTEMS

GAPPERT PLANNING STYLES





The science of understanding how to create and mature conceptual frameworks is in its infancy. The faculty of education at York University in Toronto sponsored a Summer Institute on Online Learning in 1993 (Owen, 1994). The group is attempting to specify competencies and skills that teachers should be able to model in 21st century basics. The group is a leader in its research.

A vision is based on beliefs and values that become a clear mission statement of the primary business of the establishment. The mission statement is necessary, but insufficient. All establishments need a vision statement to communicate where the business hopes to go in the future. Perhaps during the first year, most of the resources will be allocated to raising the level of awareness to achieve deeper understanding for (a) continuous quality improvement with contemporary traditional education and/or (b) creating a new full service learning system. A vision, which must be co-created by multiple stakeholders, must communicate hope and integrity in the system to move hearts and minds toward commitment and dedication. The co-created vision must then be transformed in a multi-year plan with several major categories for goals and objectives such as:

	Awareness		Commitment & Dedication		
	Year 1	Year 2	Year 3	Year 4	Year 5
(a) Policy equality quality fairness	- includes access to technology				
(b) Leadership human resources development					
(c) Curriculum content delivery evaluation	- competencies for the information era				
(d) Technology for technology ed. pre K thru 16 adult literacy					
(e) Instructional multimedia online technology					
(f) Facilities existing new					

HUMAN RESOURCES DEVELOPMENT (HRD)

Throughout the industrial era, communities of learners invented new **mosaics of education experiences** and formatted them within the limitations of the know-how, understandings, and technology of the times. The inventions included secondary schools, junior high schools, home economics and industrial arts courses, vocational tracks, jointures, area vocational- technical schools, middle schools, etc. In postsecondary education, society created normal schools that evolved into state teachers colleges, state colleges, and state universities. A broad range of institutes and two-year institutions were created. The educational infrastructure was based on provider-controlled principles.

The above-mentioned contemporary traditional education institutions represent only a very small part of the total resources that are allocated to meet the workforce training requirements for today's workplaces. Business and industry spend on training over five times the amount of money appropriated for public education. The investment in HRD includes apprentice training, industry specific training such as in printing and graphic arts, job corps, prison rehabilitation and training, etc.

It is important to examine the "ends" of the education enterprise as a prelude to discussing the "means." Over the years several groups and persons have defined the purposes of elementary and secondary education in a democracy. The purposes of education in the American demographic society are the development of each person as (a) a **worker**, (b) a **citizen**, and (c) an **individual**. Thus, basic and higher education in the American democratic society have a **vocational**, a **political**, and a **personal** dimension.

Democratic societies throughout the world differ in the way in which they organize to meet the needs of the culture and economy of which they are a part. In addition to structure, policy and decision making range from highly centralized to highly decentralized "home rule." Education is essentially a state function in the U.S. The State Board of Education in Pennsylvania has implemented a strategy to help school boards and the communities they serve to develop **new habits of mind and heart**. Just as industrial era manufacturing has gone through several stages of **modernization** and **restructuring**, so too education and training must progress through stages of development. Policy makers, leaders, and service providers are being asked to break out of the mindset of industrial era formats and to creatively envision (a) **cognitive outputs** necessary for the 21st Century and (b) **alternative formats** with more effective learning experiences for very diverse populations. The human resources development strategy for creatively envisioning alternative futures is **strategic planning**.

American Public Education: Equality and Quality

Public basic education in the U.S. is based on concepts of equality and quality. Each person is to be provided equal access to a high quality education at a reasonable cost. Access and equality have gone through multiple interpretations. Equality today is interpreted to mean access to a developmentally appropriate curriculum to increase the likelihood of student success including the entitlement to meaningful employment. Federal and state policy created by legislative process and judicial interpretations direct the flow of resources to help achieve both equality of opportunity and promotion of quality.

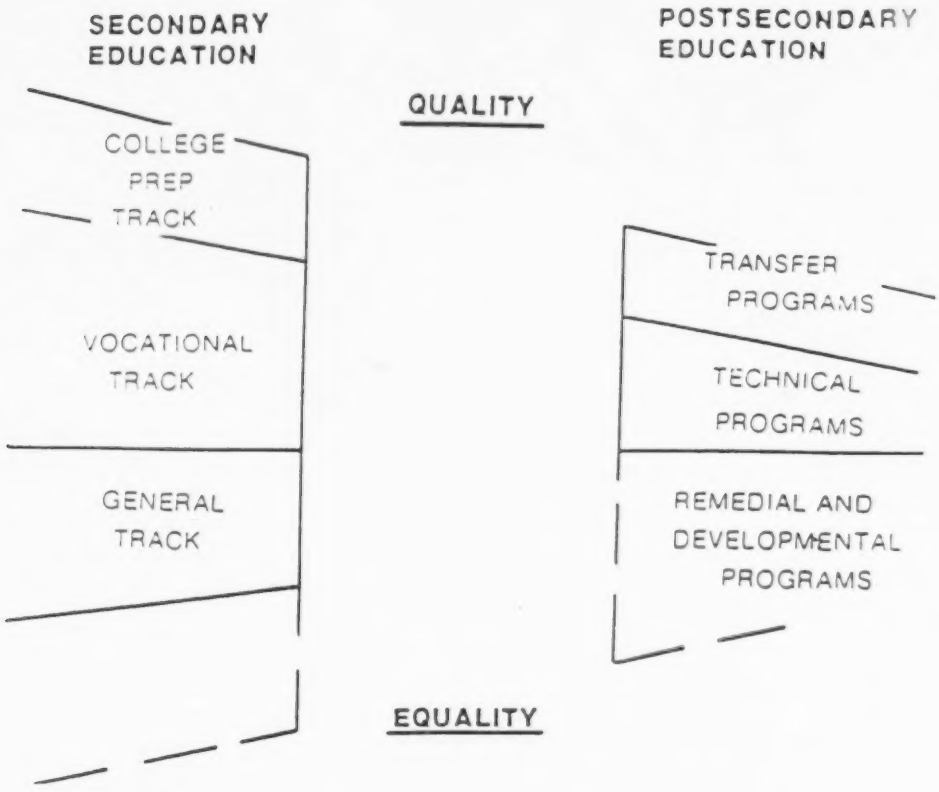
The elementary and secondary education system that has evolved consists of the academic, vocational-technical, and general tracks. Over one-fourth of the students drop out. The academic college prep track tended to be articulated between secondary and postsecondary education. Articulation was based primarily on matching course and subject titles. Too often the standards were lowered in the 1960s and 1970s. Postsecondary institutions became more extensively involved in remedial and development education. Standards are being raised but resources will be encumbered for years to overcome many deficits in preparation (see Attachment 5).

One essential issue is the synchronization of education with workplaces. Contemporary traditional formats tend to be discipline centered, layered by grade level, and provider controlled. The format assumes the content meets workplace needs. The format assumes a student can assimilate and retain sufficient knowledge and then apply it to solving problems in rapidly changing workplaces. Competencies and skills in America's workplaces are becoming increasingly more complex. Most jobs today require competency and skills that typically would be classified at a postsecondary level.

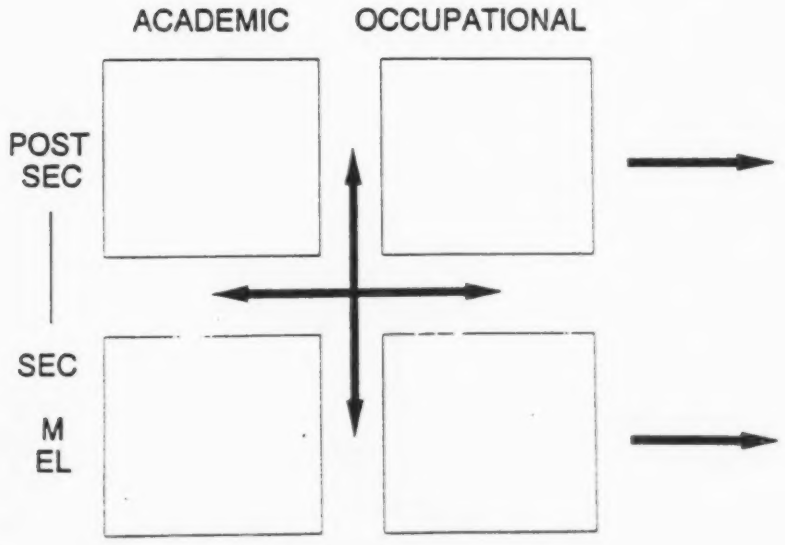
In the late 1970s, a few two-year institutions began to articulate technical programs with vocational programs at secondary schools and upper division technical programs in senior colleges in 2+2+2 formats. Program advisory committees comprised of community representatives provided input about bodies of knowledge and competencies and skills needed by workers. Secondary teachers and postsecondary faculty incorporated ideas into program sequences. DACUM (Developing A CUrriculuM) became a strategy for creating new programs as well as for program review.

Technology makes it possible to develop more effective ways for maintaining the knowledge base and competencies and skills required of workers for various workplaces. Online formats will be far more effective and efficient. Greater equality and higher quality student competencies and skills will be achieved by applying proven know-how and technology.

EQUALITY: DUAL MISSION PRIORITIES



EDUCATION WORKPLACES



Student Learning Outcomes and Technology Education

The Pennsylvania State Board of Education (SBE) adopted 15 performance-based education goals. The six Common Core goals are self worth; information and thinking skills; learning independently and collaboratively; adaptability to change; ethical judgment; and honesty, responsibility, and tolerance. The nine Academic goals are communications, mathematics, science and technology, environment and ecology, citizenship, arts and humanities, career education and work, wellness and fitness, and home economics.

In Pennsylvania, technology education encompasses the total school program, K-12. Students who go through an articulated technology education should be better prepared for lifelong learning and technological adaptability, college or postsecondary education, or vocational education. The focus in the K-6 years is on learning reinforcement and technological awareness. In grades 6-9, the focus is on orientation and exploration of technology. Specialization in technology occurs in grades 9-12 (see Attachment 6).

Technology education in Pennsylvania is based on six systems: communications, transportation, construction, manufacturing, bio-related, and engineering. Inputs, processes, and outputs are specified for each of the five systems. School districts have flexibility to develop instructional strategies to match the economy of which they are a part. For example, a school district could focus many learning activities on the bio-related and communications systems if the economy had a concentration in biotechnology. However, providing equal access to high quality programs at a reasonable cost for all students will not occur if visions are confined to traditional education formats.

Pennsylvania prepares students in vocational-technical education (VTE) through 84 area vocational-technical schools (AVTS), 513 high schools, and 87 postsecondary institutions. VTE enrollments dropped from 216,910 in 1983-84 to 107,920 in 1991-92 and program completers dropped from 52,711 to 21,654 during the same time period. Program review will be a critical issue - equal access to high quality programs. Most of the AVTS will engage in strategic planning in Phase 3 during 1995-96. Strategic planning for the SBE will occur in concert with requirements for legislation like the Carl D. Perkins Vocational and Applied Technology Education Act (Public Law 101-392), "Goals 2000: Education America Act" (P.L. 103-227), and the "School-To-Work Opportunities Act" (P.L. 103-239). Global economic forces as well as federal and state governmental mandates must be brought together in a comprehensive vision of modernized and restructured "full service" caring and learning environments which meet world class standards and are synchronized with workplace needs.

STUDENT LEARNING OUTCOMES

1. COMMUNICATIONS
2. MATHEMATICS
3. SCIENCE AND TECHNOLOGY
4. ENVIRONMENT AND ECOLOGY
5. CITIZENSHIP
6. ARTS AND HUMANITIES
7. CAREER EDUCATION AND WORK
8. WELLNESS AND FITNESS
9. HOME ECONOMICS

Regulations of the State Board of Education of Pennsylvania, 1993

TECHNOLOGY

BIO - RELATED

COMMUNICATION

CONSTRUCTION

ENGINEERING

MANUFACTURING

TRANSPORTATION

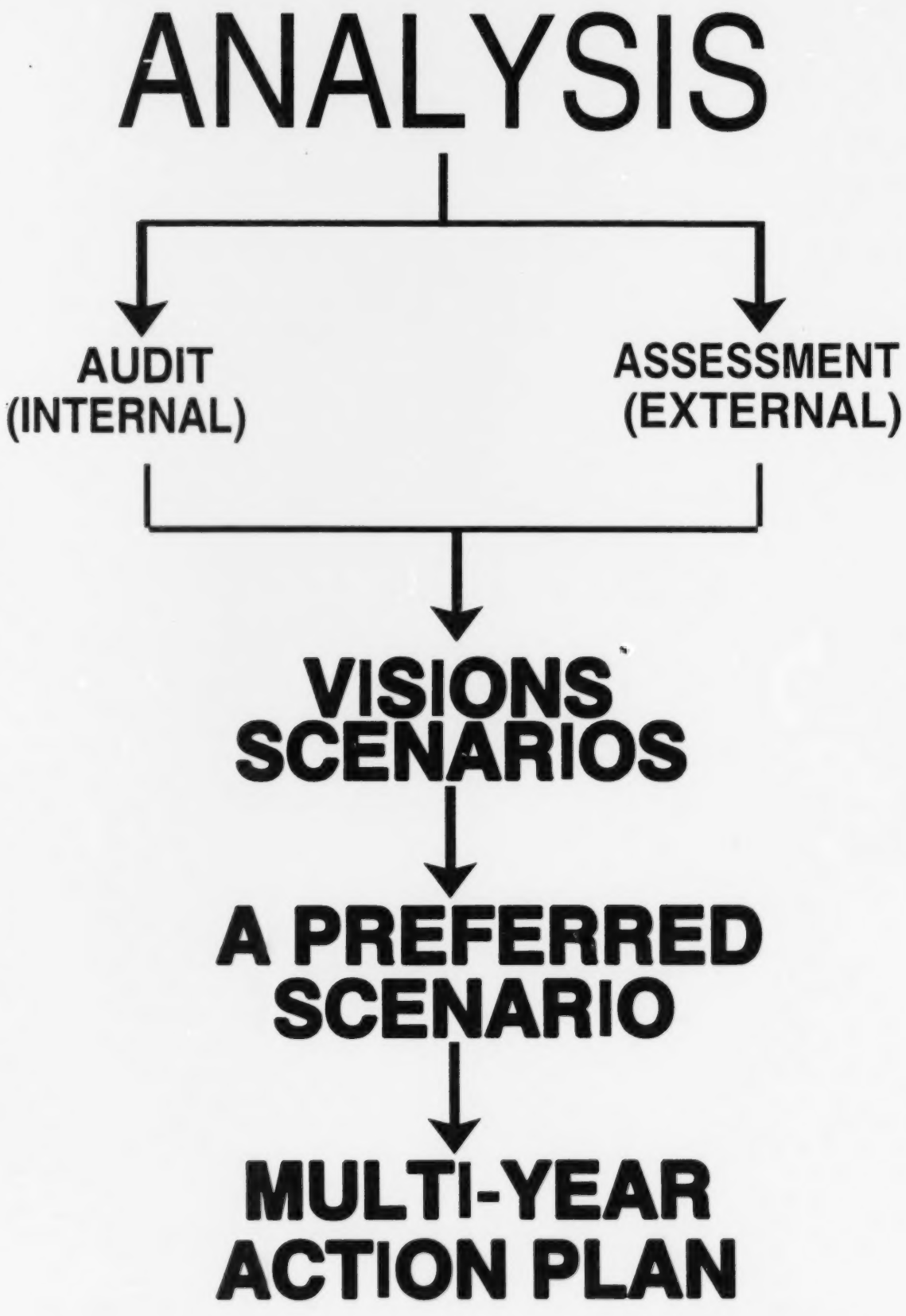
CO-CREATING A VISION AND ACTION PLAN (NEEDS)

New habits of heart and mind are achieved through leadership and human resources development (HRD) using strategies and techniques such as strategic planning, continuous quality improvement, empowerment of self-directed workteams, and site based management. Strategic planning consists of an audit of an establishment's internal environment and an assessment of the external environment for the purpose of creating visions and scenarios of the future. Strategic planning was never intended to merely adjust to minor influences or to only modify management by objectives techniques. The strategy should have been named **STRATEGIC THINKING** with a serious commitment to **Rethinking for Restructuring and Revitalizing** after A Nation at Risk was released on April 26, 1983.

During the early and mid 1970s, creating visions for education focused primarily on several demographic and social variables to develop alternative scenarios characterized as (a) expansion, (b) steady state, and (c) contraction. Accelerating expenditures in research and development netted complex communication and information technology in the late 1970s and early 1980s. The announcement in 1986 by the New York Institute of Technology that a student could complete a four-year undergraduate degree via modem and PC added impetus to developing alternative scenarios for (a) continuation of contemporary traditional education with enhancements, (b) partial technological, and (c) technology intensive leading to deschooling. Basic research in four categories of learning styles and the implementation of problem based learning models in 11 medical school programs suggested conceptual frameworks for four scenarios labeled (a) contemporary traditional, (b) partial technological and technology intensive, (c) cooperative lifelong learning, and (d) solution based learning.

Many people have experienced problem- or solution-based learning through a tenderfoot, second class, first class, star, life, and eagle type learning sequence without being hampered by formats of contemporary traditional education. All people advance through some learning progressions like beer can collecting, coin collecting, stamp collecting, etc, but without the artificial structural requirements that detract from acquiring content and processing competencies.

This section will discuss visioning and action plan development for two critical areas. The first is on creating "full service caring, learning, and loving environments" for children, youth, and families. The second area is a focus on a K-16 seamless solution-based curriculum with a focus on communications: graphic arts and printing.


ANALYSIS
AUDIT
(INTERNAL)
ASSESSMENT
(EXTERNAL)
VISIONS
SCENARIOS
A PREFERRED
SCENARIO
MULTI-YEAR
ACTION PLAN

CREATING VISIONS

AND

ALTERNATIVE SCENARIOS

OPTION 1

Expansion

Steady State

Contraction

OPTION 2

Contemporary Traditional

Partial Technological

Technology Intensive

OPTION 3

Contemporary Traditional

Partial Technological - Technology Intensive

Cooperative Lifelong Learning

Solution Based Learning

Children, Youth, and Families

One program of high priority could be to reduce the devastating impact that economic-societal restructuring is having on children and youth. What adjustments can be made to improve readiness to learn at all levels? A study by the Carnegie Corp. of New York (1994) ranked the United States last among industrialized nations in three categories: health care for children, subsidized child care, and family leaves for parents with young children. Lisbeth Schorr, a lecturer in social medicine at Harvard University stated

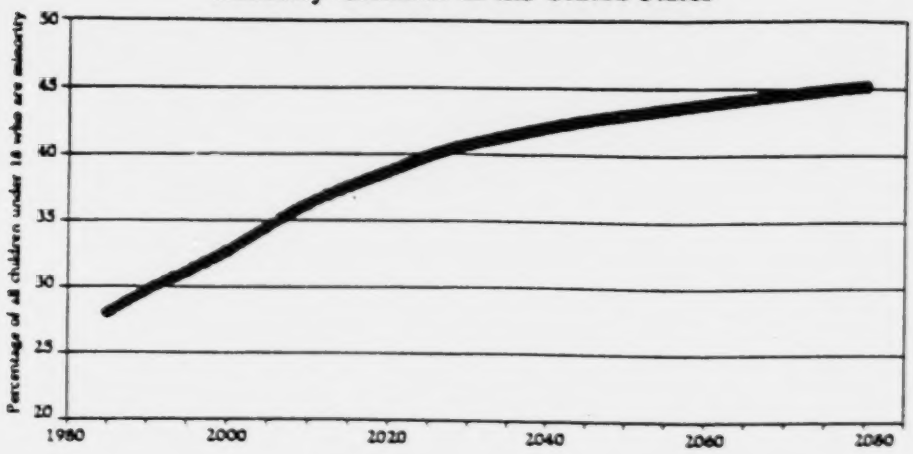
> The scientific evidence documenting the early roots of crime and violence is overwhelming.... Society pays dearly when the fundamental building blocks of health development are not in place during the infant and toddler years.

Nationally, less than 60% of all children were fully vaccinated at age 2 in 1992.

Colleges and school districts could collaborate on better services for preschool youth and their families. Okefenokee Technical Institute, GA, was fortunate to have a strategic humanist as director of the Child Care Program. Christine D. Loftin enrolled in a doctoral program with emphasis on problem solving in fall of 1991. Along with didactic coursework, she researched four areas which would contribute to a large-scale problem to be solved. These practicums paved the way for a major applied research project to co-create a **FULL SERVICE COMMUNITY FAMILY CENTER**. The strategic plan was completed in late winter of 1994 and funded by the OTI Board of Trustees. The Center is operational and (a) impacting on the quality of life of families and (b) providing a training facility for students in the Child Care Program. The Center represents a first step in the infrastructure in re-engineered services for young children and families. Imagine the potential to access databases from the Center for Disease Control and Prevention (CDC) and the Georgia Division of Public Health. A major applied research project by John J. Conklin, a survey of graduate social work programs in Canada and the U.S., indicated that service providers are not being trained to use technology and do not use contemporary technology in agencies. A state that makes a policy decision to shift from intervention to wellness could include access to online research and data from CDC through electronic technology.

College and school districts could co-create a plan with goals and objectives to impact on key result areas. High level outcomes can be achieved when purposeful human activity is coordinated through multiple agencies. The Community Learning and Information Network (CLIN) could be a resource for interagency strategic planning to create a <u>21st Century Learning and Health Care in the Home</u> (1992).

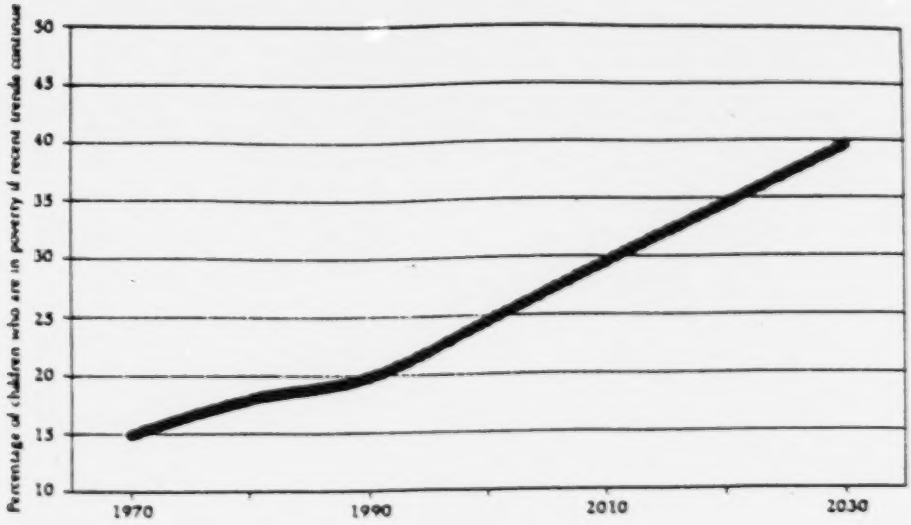
Minority Children in the United States



Year	1985	1990	1995	2000	2010	2020	2030	2050	2080
Percent	28.0%	29.7%	31.1%	32.7%	36.2%	38.7%	40.7%	43.0%	45.1%

Source: Based on Census Bureau projections.

America's Children Are Getting Poorer While the Nation Gets Richer



Year	1970	1980	1990	2000	2020	2030
Percent	14.9%	17.9%	19.8%	24.5%	34.5%	39.6%

- In the year 2000, if recent trends continue, there will be 16 million poor children in the United States, 3 million more than in 1987. One in every four children will be poor.
- By the year 2030, there will be 25 million poor children. One in every three children will be poor.

Source: CDF computations based on Census Bureau data.

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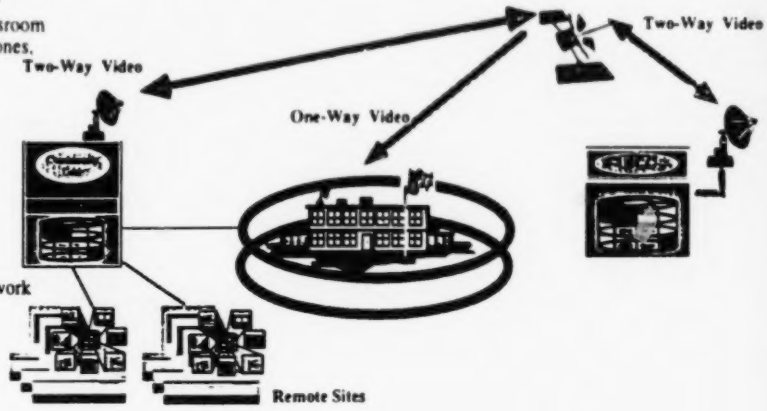
The Composition of a Prototype Community Learning and Information Network Site

The first 120 sites selected for implementation will require hardware and necessary adjustments to existing facilities to be fully operational.

Each site will be initially equipped with:

- A fully two-way interactive video classroom for 25 participants (monitors, microphones, camera, etc.)
- Video satellite antenna
- A data storage and retrieval computer
- 2 teacher's computer workstations
- 25 multimedia desktop computers
- Training
- Maintenance etc
- Power / phone line installation & site work



Review of CLIN Vision

- **National Imperatives**
  - **Help Stop American Educational Decline** - *Highest SAT Scores Were In 1970*
  - **Improve Effectiveness Of American Workforce** - *Industry Spends $40(+) Billion/Yr In Training*
  - **Make Business More Competitive** - *US Must Compete In Global Market*
  - **Better Prepare The Reserves And The National Guard** - *Citizen Soldier Is Key In Communities*
  - **Re-energize High Tech Manufacturing In America** - *Increase Numbers Of Businesses & Jobs*
- **Concept**
  - **Implement A National Learning Technology And Information Delivery System**
  - **Network 50,000,000 Computers In 110,000 Schools** - *A Computer On Every Student's Desk*
  - **Financed Through "Shared Usage" By Federal, State And Local Governments And Industry Excess Capacity Pays For School Usage**
  - **Prototype Pilot Sites (120 Desired) Cost Paid By Federal Government**
  - **Full Implementation Driven At Local Levels With Federal Support For The Network**

CLIN CONCEPT ADDRESSES EDUCATION, COMPETITIVENESS AND NATIONAL SECURITY - WITHOUT NEW TAXES

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21ST CENTURY LEARNING AND HEALTH CARE IN THE HOME:

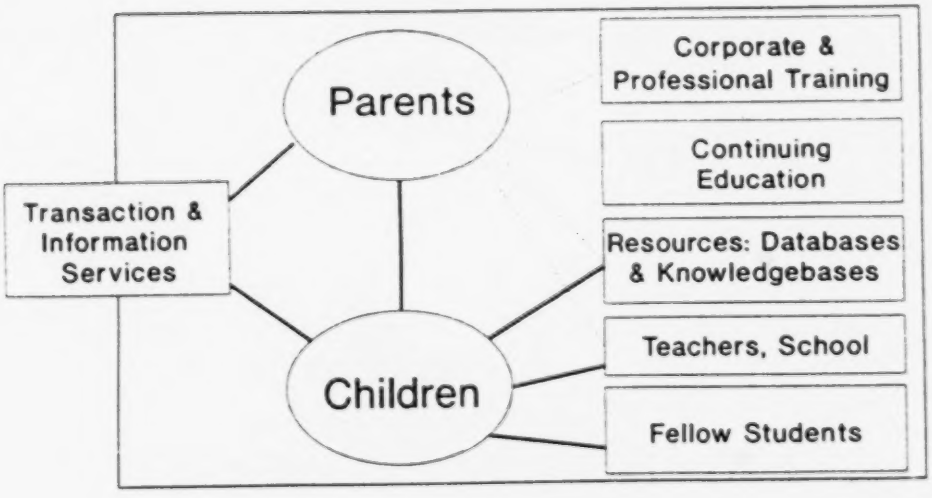
CREATING A NATIONAL TELECOMMUNICATIONS NETWORK

108 North Alfred Street
Alexandria, VA 22314
(703) 684-5880

1631 Suter's Lane N.W.
Washington, D.C. 20007
(202) 333-6035

POTENTIAL ELECTRONIC FAMILY LEARNING ENVIRONMENT

FIGURE 1



K-16 Seamless Solution-Based Curriculum

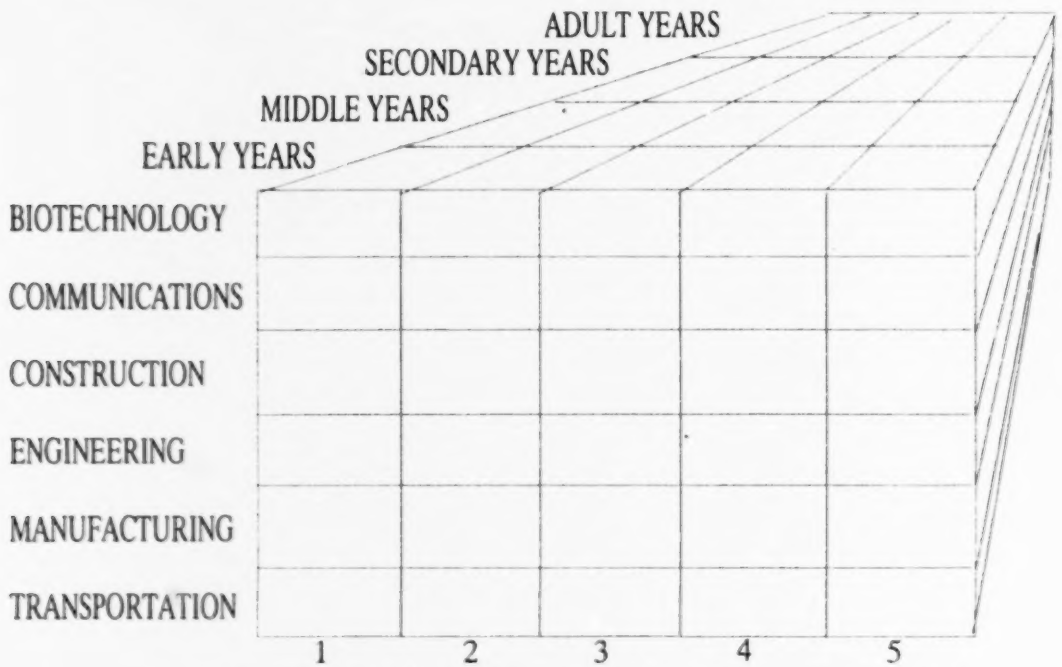
A knowledge-based, technology education, curriculum focused on solutions applies to all levels of education. What could be more exciting to children in the early years than learning about (a) animals and how they grow up into healthy pets - **bio-related technology education** and (b) advertising and packaging for favorite toys - communications involving **graphic arts and printing** including prepress, press, and postpress functions? What could be more exciting for youth than analyzing **communication systems** and how humans and machines input, process and output various categories of data and information to yield "intelligence?"

Good health and nutritian are the foundation upon which masterpieces can be created. The process begins with sound bodies for childbearing youth through prenatal care and parenting. We are still in the early stage of development in terms of understanding human body chemistry. However, the agricultural industry has perfected that type of science for other species of the animal kingdom and makes use of contemporary technology in applying that knowledge.

How could a K-16 seamless solution-based curriculum be co-created to increase the likelihood of producing more and better **High Performance Learners and Workers**? How can such a curriculum contribute to increased performance in basic areas such as communication skills of reading, writing, listening, and speaking? National voluntary standards have been specified in core areas of mathematics, science, history, arts, civics, geography, and English. In addition, national voluntary standards are being specified and learning materials developed in 22 occupational areas including agricultural biotechnology, bioscience, chemical process industries, health care, etc.

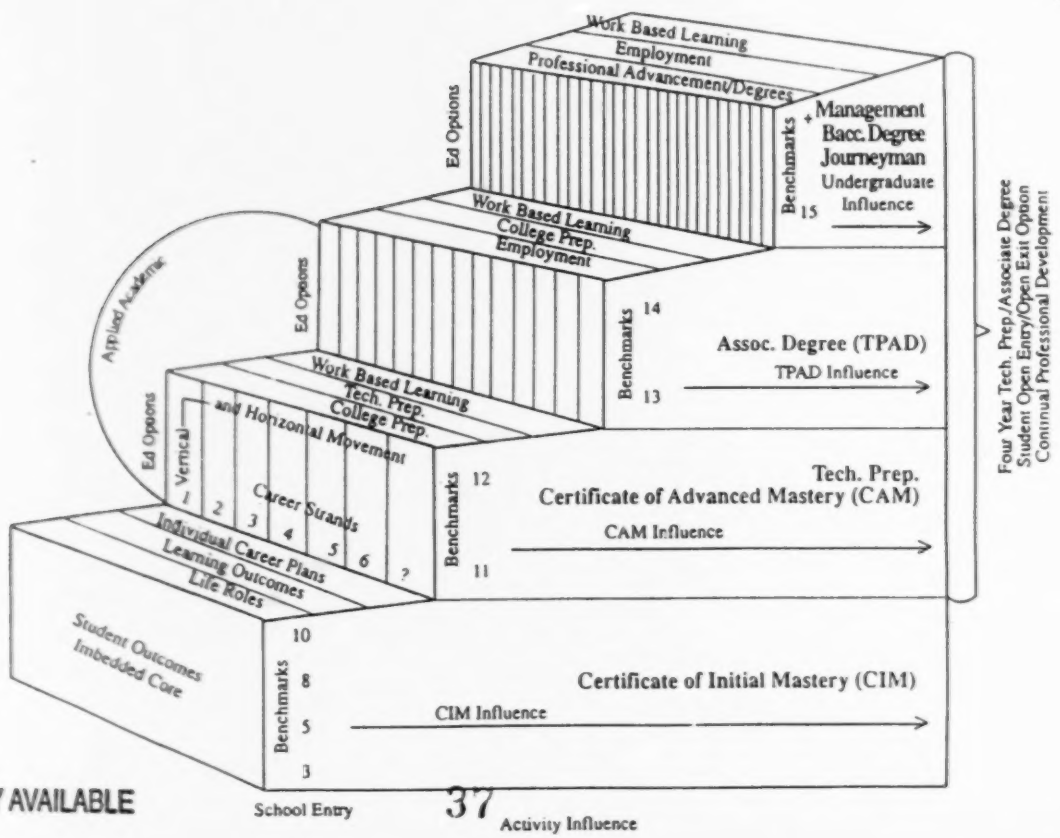
Citizens, faculty and teachers from various disciplines, and students through "service learning contracts" could specify a series of problems to be solved and develop materials for multiple intelligences for learners at several stages of development. These learning packages could be tested in a paper format and then refined for online delivery. A student is working on a major applied research project to develop a modular technology curriculum for exploratory agriculture education and a second is working on a similar project in business at the secondary level. Imagine the impact of delivery of a series of modules into the feeder elementary schools or through CLIN, the Agricultural Satellite Network, or the Black College Satellite Network. Then, imagine the impact of the delivery of modules through the interactive "global classroom" of the Department of Defense Dependent Schools (DoDDS) or to areas where conditions are extreme such as in Afghanistan, Haiti, Mozambique, and Somalia.

BORDERLESS & SEAMLESS SOLUTION BASED LEARNING



CONTINUOUS QUALITY IMPROVEMENT BENCHMARKS
TO PRODUCE HIGH PERFORMANCE LEARNER WORKERS

1/2/92



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Communication Systems: Graphic Arts and Printing

An extremely high priority relates to understanding the communication system which is evolving and integrating that body of knowledge into a curriculum with developmentally appropriate content and delivery system formats. Business is already using voice activated PCs that transmit audio, data, and voice to multiple locations simultaneously. Within the next few years it will be possible to send high quality education and training in an open entry - open exit format into a community agency, home, school site, or workplace. Genuine partnerships between education at all levels and the private sector are emerging and they will create a seamless articulated and integrated set of learning experiences with generic competencies and domain specific skills. Domain specific skills could include the voluntary standards for the 22 occupational projects funded by the U.S. Departments of Education and Labor.

A policy statement such as "All students should have access to databases and information highways from home and institution" requires careful analysis in developing the education technology plans. Availability of contemporary technology to access Internet is the civil rights issue of the decade. And, the U.S. is only in the first wave of basic technology. Education technology includes the hardware and software for technology education and the application of technology to enhance all learning.

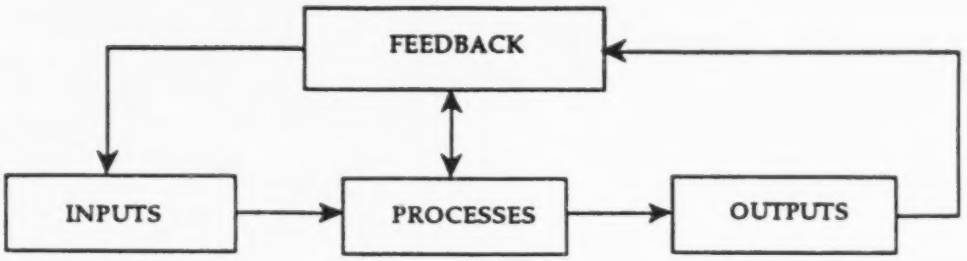
A Communication System Task Force (CSTF) could provide direction for the program. The CSTF could include private and public sector representatives. The CSTF could recommend projects that could be developed over the next few years. College and schools, with private sector establishment partners, could become the lead institution for communications technology in the region.

Graphic arts and printing (GAP) are an integral part of the communication system. GAP is critical because it relates to effective communication, cultural diversity, multiple intelligences, and the seven ways of learning. GAP is essential because it relates to literacy, productivity, and democracy. The Research and Engineering Council of the Graphic Arts Industry, located in Chadds Ford, PA, analyzes basic research, patents, and trends in the industry (Critical Trends, 1989, 1994). The Graphic Arts Technical Foundation (GATF) in Pittsburgh, PA, engages in some basic research and provides training for the industry. GATF coordinates the "Printing Skill and Knowledge" occupational standards project. Understanding the "Evolution of the Textbook: From Print to Multimedia" would also be important in co-creating a K-16 electronic online seamless program in GAP (Greenfield, 1993; Groff, 1994, ED 352 126).

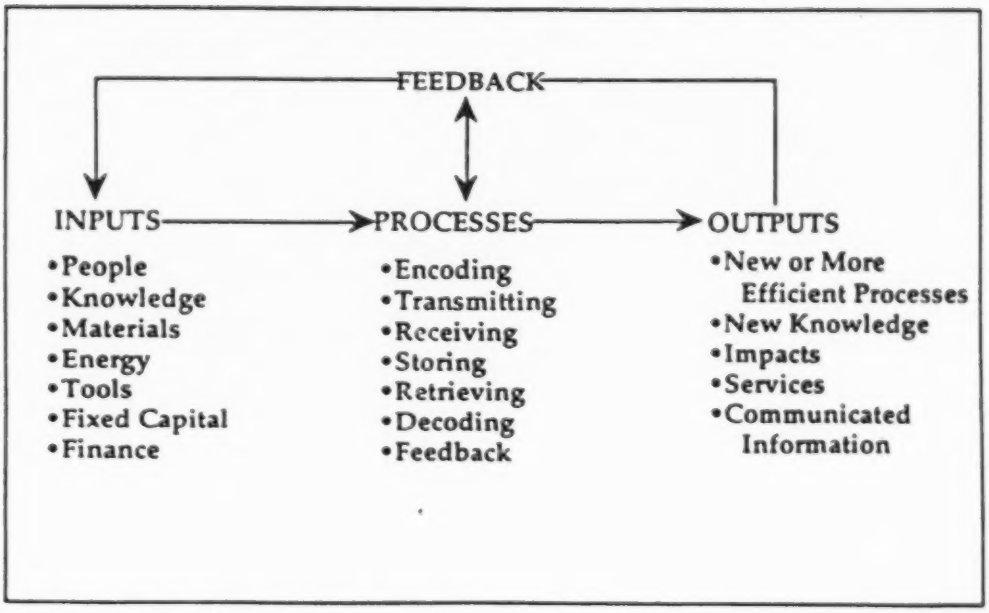
THE UNIVERSAL SYSTEMS MODEL

A system suggests a combination of elements or parts that work together to accomplish a desired goal. Technology education uses the Universal Systems Model as an organizational tool to help both teachers and students understand the concept of systems.

UNIVERSAL SYSTEMS MODEL



THE COMMUNICATION SYSTEM



Eagles and Explorers in Search of Lighthouses

The Boy Scouts of America program has a focus on demonstrated competence with specified requirements to advance from tenderfoot, second class, first class, star, life, eagle with palms, and through explorer designations. Contemporary communication and information technology is making it possible to envision a pre K through graduate learning continuum which is vastly more effective than contemporary traditional education and will minimize many geographic, physical, and temporal limitations. America 2000 is a spirit of renewal, to reaffirm basic beliefs and values and then invent next generation womb to tomb human resources development systems based on contemporary know-how and technology, to proactively create "lighthouses."

The Greater Philadelphia Area Citystate (GPAC) could be a lighthouse for eagles and explorers. The GPAC is the birthplace of American democracy with Valley Forge National Park and Independence National Historical Park, site of the Liberty Bell and Independence Hall. The Freedoms Foundation at Valley Forge has an American Credo that indicates freedom and responsibility are mutual and inseparable. Graphic arts and printing are essential to improved literacy, increased productivity, and improved understanding of democracy and other cultures and political systems. Montgomery County could play a lead role in creating a conceptual framework for a K-16 learning continuum focused on bio-related and/or graphic arts/printing that could evolve from local area networks (LANs) to Taiwan.

The GPAC has one of the largest concentrations of biotechnology, pharmaceutical, and health care industries in the world. The graphic arts and printing assets were listed in the previous section. Montgomery County Intermediate Unit (MCIU) is comprised of 22 school districts. MCIU is committed to contemporary technology including a series of programs related to use of Internet. Montgomery County has several corporations engaged in basic research and development such as Merck & Co., Unisys Corp., and Ford Electronics. Several of these corporations are in the North Penn School District, with its high school adjacent to the Northern Montgomery County Technical Career Center. North Montco has programs in (a) Health and Human Services Technology and (b) Visual Communications Technology with specializations in Commercial Art Technology and Graphic Arts Technology, both with excellent competency outcomes.

Distance education online learning modules in graphic arts and printing could be a joint project of all school districts in North Montco and distributed electronically to elementary and secondary schools, and homes and public libraries. The second phase could include the distribution of learning modules to other areas in the GPAC via LANS.

The GPAC LANS could include (a) Eastern Montgomery County, PA; (b) Western Montgomery County, PA; and (c) central PA. LANS in the MCIU could link to Montgomery County Community College and Penn State Ogontz, a designated tech-prep area. A link to central PA would lead to Millersville University with an undergraduate and graduate program in technology education. The MU technology education programs were analyzed for the creation of a strategic plan for a graphic arts and printing technology program at National Taiwan Normal University, a plan funded by the Ministry of Education (MOE) in 1995 (Sheu, 1995). MOE has made a commitment to technology education. Junior high schools began the conversion process by developing guidelines and then providing inservice training for industrial arts and home economics teachers in 1993-94. Guidelines were developed for high schools. Collaborative planning could lead to a Sino-American partnership for the 21st Century.

A parallel tandem program would be the creation of distance education learning modules in bio-related education that could be distributed in a similar manner. This program requires considerable analysis because of policy issues. Another parallel program would be the creation of distance education learning modules that relate to democracy as practiced in the U.S. and other countries and then extending our understanding of other cultures and political systems.

The creation of distance education learning modules and delivering them will require new habits of heart and mind. Young children have little difficulty adjusting to contemporary technology. A comprehensive program would have to be designed and implemented to familiarize teachers with technology which would lead them from levels of awareness and understanding to high levels of commitment and use. The program could begin with "Highway Construction 101" to become familiar with advances in research and development, the impact of science and technology, and the implications for human resources development. That series could be followed with "Net Repair 102" to understand internet networks, NSFNET supercomputers, and online and satellite systems. A third series could be "Global Messages 103" to learn about learning communities of the future, cultural diversity and how people and societies differ, and electronic publishing and "systems."

Human resources development for teachers could be delivered in a didactic format with some instruction offered in laboratories for hands-on experience. Instruction could also be offered in a multitech format with selected modules available in an online format. The "Learning Styles" menu could help teachers access the latest in contemporary research by Drs. Rita and Kenneth Dunn and others.

TECHNOLOGY

1996 1997 1998 1999 2000

Asynchronous Transfer Mode
Audio Editing Packages
Cellular
C D Rom
Desktop Conferencing
Digital Video Everywhere
Document Conferencing
Integrated Services Digital Network
Multimedia
Personal Digital Assistant
Smart Technologies
Teleconferencing
Videoconferencing

RETHINKING FOR RESTRUCTURING AND REVITALIZING
NEW HABITS OF MIND AND HEART

HIGHWAY CONSTRUCTION 101	*NET REPAIR 102*	*GLOBAL MESSAGES 103*
Advances in Research and Development	*Internet Networks*	*Learning Communities of the Future*
Impact of Science and Technology	*NSFNET Supercomputers*	*Cultural Diversity: People and Societies*
Implications for Human Resources Development	*Online and Satellite Systems*	*Electronic Publishing and "Systems"*

HUMAN RESOURCES DEVELOPMENT - MULTI-TECH

ORIENTATION	1ST MONTH	2ND MONTH	3RD MONTH
NOVA UNIVERSITY PROGRAM FOR HIGHER EDUCATION HUMAN RESOURCES DEVELOPMENT 1. ANALYSIS (AUDIT) 2. VISION 3. ACTION PLAN DIAGNOSTIC TESTS 1. PEOPLE 2. ESTABLISHMENTS LUNCH MULTI-TECHNOLOGY SEQUENCE OF LEARNING ACTIVITIES	ANALYSIS VIDEOTAPE (WORKSITE AUDIT) Ecr #1 1. AUDIT REVIEW 2. FOUR PROJECTS VISION VIDEOTAPE (CONCEPTUAL FRAMEWORK FOR ONE PROJECT) Ecr #2 VISION-CREATION AND CO-CREATION	ACTION PLAN VIDEOTAPE Ecr #3 1. RATIONAL 2. GOALS: OBJECTIVES RESOURCES AUDIOTAPE 1. FOUNDATIONS 2. FEDERAL GOVT. Ecr #4 1. METHODOLOGY 2. EVALUATION 3. BUDGET	VIDEOTAPE ON ORAL PRESENTATION Ecr #5 1. ISSUES 2. FINAL EXAMINATION PRACTICUM VIDIOTAPE 1. RESEARCH QUESTIONS 2. METHODOLOGY Ecr #6 SYNTHESIS AND EVALUATION
OUTCOME: A PROFESSIONAL DEVELOPMENT PLAN			

MULTI-TECH MENU

ANALYSIS	VISION & VISIONING		ACTION PLAN
Mission Review	Mind &	Systems	Readiness
Philosophy	Cognitive Dev.	Strategic Planning	a. Preschool
Vision	Social Dev.	Outcomes Based Ed.	b. Parents
Policies	Physical Dev.	Needs Assessment	c. Health
Functions	Moral Dev.	Program Review	Math, Sci., Tech
Know how	Learning Styles	Total Quality	a. Math
Technology	Planning	Tech. Prep.	b. Science
	Preferences	150 9000	c. Technology
Budget	Neurolinquistic	Site Based Mg.	- Bio-related
	Programming	Org. Dev.	- Communication
		Databases	- Construction
		Networks	- Engineering
			- Manufacturing
			- Transportation

LEADERSHIP AND HUMAN RESOURCES DEVELOPMENT ACADEMY

The Greater Philadelphia Area Citystate (GPAC) could create a Leadership - Human Resources Development Academy (LHRDA). The purpose of the GPAC would be to (a) raise the level of awareness about bodies of information that are essential to strategic planning for re-engineering the learning enterprise; (b) provide assistance to colleges and school districts in their service areas about the various phases of strategic planning, managing, and evaluating; (c) serve as a link to private and public sector establishments using contemporary technology; and (d) help in developing multi-year action plans and in leveraging fiscal resources.

Leadership and human resources development are the critical ingredients in "**learning to learn**" to adapt to a complex, dynamic, and rapidly changing society. Leadership and human resources development academies have been emerging over the past decade. Academies have changed their function and role over the years to respond to the requirements of their sponsors. Just as it is possible to identify technologies that are critical for the 21st Century, so too it is possible to identify bodies of knowledge that must be understood for restructuring education. Two categories of research are the **cognitive sciences** and **systems**.

Cognitive Sciences: Mind

Research in the **cognitive sciences** will play a major role in re-engineering education. This includes research about learning styles and what is learned through technology such as magnetic resonance imaging (MRI). Scientists can now peer into the human brain through MRI and observe changes that occur as the mind works. Imagine being able to observe cognitive synapses while a human is engaged in the inputting, processing, and outputting information such as the integration of math, science, and technology to solve problems. Brain-actuated control has been developed in several labs across the world. Electrodes attached to the head key in on brain waves and monitor them for voltage changes which are then interpreted as computer commands. People have turned lights and TVs on and off, operated typewriters, and moved cursors across video screens.

It is important to understand what research exists and how that body of knowledge can be applied to enhance learning effectiveness. Research about interaction analysis became a basis for some work at Research for Better Schools in the 1960s and 1970s. Research about learning styles led to the Center for the Study of Learning and Teaching Styles and the Learning Styles Network co-sponsored by the National Association of Secondary School Principals and St. John's University in NY. Continued research on how the mind works led to the Brain Based Education Network coordinated by The

Institute for Learning and Teaching at the Center for the Advancement of Reform in Education and The Multiple Intelligences School Network by Phi Delta Kappa.

A second focus of inquiry relates to online learning. Two decades ago it would not have been possible to create a system to deliver education and training into the community, home, or workplace. Any Home A Classroom (Halperin, 1984) and The Education Utility (Gooler, 1986) describe technology intensive delivery systems. In 1986, The New York Institute of Technology announced that a student could complete an undergraduate degree at home via a modem and PC. While a few communities may still be debating telephone access in a classroom, children and youth are surfing the Internet at home or in charter schools (Hancock, 1994). Home based learning increased dramatically during the 1980s. A few students educated at home have graduated at the top of their college class. It is possible to extend performance based education models and envision online learning communities based on a conceptual framework of solution based learning.

A third area relates to visioning. Research over the past fifteen years indicates that visioning alternative futures varies by planning style. This type of research is important to participating colleges and schools to envision an alternative scenarios and create a multi-year action plan to develop a partial technological delivery system.

Systems: Databases and Networks

The U.S. National Information Infrastructure (NII) initiative has accelerated. Vice President Gore is chairing the initiative on Making Government Work: The Electronic Delivery of Federal Services (1993). Commerce Secretary Brown chairs the Information Infrastructure Task Force Committee on Applications and Technology which produced Putting the Information Infrastructure to Work (1994) that addresses manufacturing, commerce, health care, learning, environment, libraries, and government service delivery. The Federal Quality Institute provides access to numerous total quality documents through its Information Network (1993). The Office of Science and Technology Policy of the Executive Office of the President has focused activities on a "Societal Learning System." The Advanced Technology Program has funded 70 projects for the development and application of software and informmation technology. "Goals America: Educate America Act" (Public Law 103-227) refined the mission of the Office of Educational Research and Improvement in the U.S. Department of Education to assist in building "Pathways to a National Learning Community." What databased and networks are or will become available?

Effective use of systems in re-engineering education requires a basic understanding of (a) hard technology, (b) soft technology, (c) systems design, (d) HRD multi-media, and (e) policy. Asychronous transfer mode (ATM) technology is being produced by at least 36 companies in the U.S. ATM technology allows a person to view four other sites in real time. ATM is being deployed in North Carolina in 58 high schools, 18 community colleges, and 16 campuses of the University of North Carolina. Imagine the potential of a person interacting simultaneously with four other individuals or groups on a monitor. The groups could be on large screen as they are at Brooks Air Force Base in San Antonio. If it were necessary to have more groups, additional systems can be used. Cellular technology can be used with language conversion software and voice activated technology to yield a "Continuous Voice Activated Wireless Powerbook" capable of accessing databases through a local area network and sending the files electronically almost anywhere in the world.

Know-how technology includes strategic planning and many other human resources development strategies which have yet to reach full maturation. Strategic planning was intended to assist enterprises envision alternative futures. Most establishments that have used strategic planning have not seriously extended the audit of the internal environment and the assessment of the external environment for the purpose of visioning next generation HRD systems. Other know-how technology is important in re-engineering.

Numerous models of alternative next generation systems are evolving. New American Schools Development Corporation (NASDC) projects could be analyzed. Roots and Wings has a focus on effectively restructuring to impact in the early years of young children. Co-NECT has a focus on problem-based or solution-based learning. The Community Learning Centers is an extension of the Comprehensive Learning Center concept which builds on the open entry and open exit format. Numerous "free nets" and electronic villages are evolving. Libraries and media centers are the hub of the evolving learning enterprise and are critical in technology plans.

Distance education models should be analyzed to assist in the use of significant components or even entire models. The content would include contemporary basic research and exemplary practice about computer-based distance learning in a multitech format with extensive use of online seminar sessions. The delivery system would be created from an analysis of distance education leaders such as Nova Southeastern University, National Technological University, Walden University, Virtual Online University, Mind Extension University, Motorola University and Armstrong World Industries. Both companies use ATM for training employees in foreign countries, including Pacific Rim nations.

Policies and Programs and Projects

The LHRDA would help leaders and policy makers focus discussions on (a) policies and (b) programs and projects? Policies created at national level have implications for state and local levels. The U.S. Government is helping the private sector with the nation's competitiveness through several programs including (a) the Research & Development Laboratories, (a) the Advanced Technology Program (ATP) of the National Institute of Standards and Technology (NIST) and (b) the National Information Infrastructure (NII) through the National Telecommunications and Information Administration (NTIA). The U.S. Government funds over 600 research and development (R & D) laboratories to advance science and technology in agriculture, education, health, military and space, and other fields. Technology Transfer (TT) from R & D Centers began to accelerate in the 1980s. With the end of the cold war, R & D is being refocused for domestic commercialization and could accelerate even more rapidly through the National Technology Transfer Center (NTTC). R & D and TT are being focused on the National Information Infrastructure (NII).

Since 1990, the ATP has worked to advance the nation's competitiveness by funding powerful, new technologies that underlie a broad spectrum of applications, commercial products, and services. Some of the ATP projects are "Multi-media Information Access and Training," "Education and Training Software," "Digital Science and Engineering Information on the NREN," "Education Technology", and "Interactive Training for the Unemployed." 1995 program competitions are as follows:

- Digital Data Storage (95-03),
- Digital Video in Information Networks (95-04),
- Materials Processing for Heavy Manufacturing (95-07),
- Component-Based Software (95-09),
- Information Infrastructure for Healthcare (95-10), and
- Manufacturing Composite Structures (95-11).

The U.S. Department of Commerce is accelerating work on the National Information Infrastructure (NII) through the National Telecommunications and Information Administration (NTIA). Last year the Telecommunications and Information Infrastructure Assistance Program (TIIAP) awarded $24.4 million in Federal funds to 92 projects. TIIAP has $64 million to award in the 1995 fiscal year.

These and other policy and program decisions have tremendous implications for community colleges which are the primary source of human and technical workers. Community colleges can play a significant role in improving the quality of life and economic development in their service area. Several projects are discussed as examples.

Conceptual Framework for a Multi-year Action Plan

Year 1 Year 2 Year 3 Year 4 Year 5

Cognitive Science: MIND
Basic Research
Online and Solution
  Based Learning
Visioning

Systems
Hard Technology
ATM
Cellular
Communications
Digital
Electronic Publishing
Voice Activiated
  ENHANCEMATE
  IN CUBE
  VERBEX

Know-How Technology
Strategic Planning
Needs Assessment
Trend Analysis
Outcomes Based Educ
Performance Funding
Program Review
Site Based Management
Tech Prep
Total Quality
School-To-Work
ISO 9000

Systems Design
NASDC
  Roots and Wings
  Co-NECT
  CLC
Electronic Village
Libraries & Media Centers

Distance Education
Nat. Tech. Univ.
Univ. of the World
Nova Southeastern U.

Policy and Programs & Projects
Research & Development
Advanced Technology Program
Children, Youth, and Families
K-16 Seamless Curriculum
Communication Systems

CONCLUSIONS

The world is undergoing fundamental restructuring. The European Community, the Pacific Rim countries, and the North American Free Trade Agreement countries are adjusting their economies in order to be the dominant region in the new world order. The nations, regions, and states that will be the beneficiaries of the structural change will be the ones that adjust and restructure systems and human resources development infrastructure to produce the knowledge workers who are needed for the new information era. All nations belonging to the Organisation for Economic Co-operation and Development are engaged in thinking strategically about the learning enterprise in the 21st Century.

The U.S. needs private and public sector establishments committed to inventing "Learning Communities" that empower humans to lead as opposed to merely adjusting to conditions. "Learning Communities" could accept a challenge such as "To design and perfect a human resources development system to produce knowledge workers of the 21st Century." While not all the knowledge is available to invent next generation learning systems, that must not deter us from striving toward such a goal. The words have a "future pull" magnetism to them that suggest that community leaders, practitioners, and scholars with expertise in theory, research and applications should be able to create bold, visionary systems with increased excellence, somewhat akin to New American Schools Development Corporation projects.

We are privileged to live during an extraordinary time, the turning of an era. We are surrounded with technologies which will fundamentally transform society and make possible the emergence of a learning enterprise with the potential to achieve higher levels of excellence and equality than can possibly be fully imagined by even the most experienced futurists. To achieve the dual mission priorities will require <u>New Habits of Mind and Heart</u>. Achievement of the mission priorities will require collectively focusing our minds on best practices and exemplary research to co-create visions of better systems and then having the heart to transform a preferred scenario into a multi-year action plan with appropriate resources.

* * * * * * * * * *

Problems cannot be solved at the same
level of consciousness that created them.

Albert Einstein

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We are made wise not by the recollections of our past
but by the responsibility for our future.

George Benard Shaw

APPENDIX

* * * * * * * * * *

A "Third Wave" Electronic College

Judith W. Leslie uses Toffler's The Third Wave to develop an educational institution in an advanced technical era dominated primarily by electronic media.

> This methodology would allow the learner to proceed at his/her own rate and style, within his/her own time period, at his/her desired location, drawing upon learning materials from throughout the country and the world. Computer science and electronics courses and programs of study would be an integral part of the curriculum. Faculty would be cross-trained in a variety of disciplines and teaching styles. They would have flexible work schedules and loads and might share an assignment with a spouse or colleague. Many faculty would instruct from their home or electronic cottage....
>
> Judith W. Leslie. "As The Third Wave Approaches Higher Education: Planning For the Electronic Institution," CAUSE/EFFECT, January 1981, Vol. 4, No. 1, p. 15.

THE AMERICAN CREDO

POLITICAL AND ECONOMIC RIGHTS
WHICH PROTECT THE DIGNITY AND
FREEDOM OF THE INDIVIDUAL

CONSTITUTIONAL GOVERNMENT
DESIGNED TO SERVE THE PEOPLE.
FUNDAMENTAL BELIEF IN GOD.

- RIGHT TO WORSHIP GOD IN ONE'S OWN WAY.
- RIGHT TO FREE SPEECH AND PRESS.
- RIGHT TO PEACEABLY ASSEMBLE.
- RIGHT TO PETITION FOR REDRESS OF GRIEVANCES.
- RIGHT TO PRIVACY IN OUR HOMES.
- RIGHT OF HABEAS CORPUS—NO EXCESSIVE BAIL.
- RIGHT TO TRIAL BY JURY—INNOCENT UNTIL PROVED GUILTY.
- RIGHT TO MOVE ABOUT FREELY AT HOME AND ABROAD.
- RIGHT TO OWN PRIVATE PROPERTY.
- RIGHT TO FREE ELECTIONS AND PERSONAL SECRET BALLOT.
- RIGHT TO WORK IN CALLINGS AND LOCALITIES OF OUR CHOICE.
- RIGHT TO BARGAIN WITH OUR EMPLOYERS AND EMPLOYEES.
- RIGHT TO GO INTO BUSINESS, COMPETE, MAKE A PROFIT.
- RIGHT TO BARGAIN FOR GOODS AND SERVICES IN A FREE MARKET.
- RIGHT TO CONTRACT ABOUT OUR AFFAIRS.
- RIGHT TO THE SERVICE OF GOVERNMENT AS A PROTECTOR AND REFEREE.
- RIGHT TO FREEDOM FROM ARBITRARY GOVERNMENT REGULATION AND CONTROL.

TO PERSONALLY UNDERSTAND AND MAINTAIN THE AMERICAN WAY OF LIFE, TO HONOR IT BY HIS OWN EXEMPLARY CONDUCT, AND TO PASS IT INTACT TO SUCCEEDING GENERATIONS IS THE RESPONSIBILITY OF EVERY TRUE AMERICAN.

Developed and distributed by Freedoms Foundation at Valley Forge

Bill of Responsibilities

Preamble. Freedom and responsibility are mutual and inseparable; we can ensure enjoyment of the one only by exercising the other. Freedom for all of us depends on responsibility by each of us. To secure and expand our liberties, therefore, we accept these responsibilities as individual members of a free society:

To *be fully responsible for our own actions and for the consequences of those actions.* Freedom to choose carries with it the responsibility for our choices.

To *respect the rights and beliefs of others.* In a free society, diversity flourishes. Courtesy and consideration toward others are measures of a civilized society.

To *give sympathy, understanding and help to others.* As we hope others will help us when we are in need, we should help others when they are in need.

To *do our best to meet our own and our families' needs.* There is no personal freedom without economic freedom. By helping ourselves and those closest to us to become productive members of society, we contribute to the strength of the nation.

To *respect and obey the laws.* Laws are mutually accepted rules by which, together, we maintain a free society. Liberty itself is built on a foundation of law. That foundation provides an orderly process for changing laws. It also depends on our obeying laws once they have been freely adopted.

To *respect the property of others, both private and public.* No one has a right to what is not his or hers. The right to enjoy what is ours depends on our respecting the right of others to enjoy what is theirs.

To *share with others our appreciation of the benefits and obligations of freedom.* Freedom shared is freedom strengthened.

To *participate constructively in the nation's political life.* Democracy depends on an active citizenry. It depends equally on an informed citizenry.

To *help freedom survive by assuming personal responsibility for its defense.* Our nation cannot survive unless we defend it. Its security rests on the individual determination of each of us to help preserve it.

To *respect the rights and to meet the responsibilities on which our liberty rests and our democracy depends.* This is the essence of freedom. Maintaining it requires our common effort, all together and each individually.

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FIVE-COUNTY PROFILE

VITAL STATISTICS

1990	Population	Employed	Civilian Labor Force	Unemployment Rate	Median Household Income	Per Capita Capita Income
Philadelphia County	1,585,577	674,000	725,000	7.0%	$24,603	$12,091
Bucks County	541,174	286,900	299,500	4.2%	$43,347	$18,292
Chester County	376,396	193,800	200,300	3.2%	$45,642	$20,601
Delaware County	547,651	279,900	290,900	3.8%	$37,337	$17,210
Montgomery County	678,111	374,600	388,900	3.6%	$43,720	$21,990
5-County Total, Pennsylvania	3,728,909	1,809,202	1,904,600	5.0%	$35,273	$16,402
Philadelphia PMSA [1]	4,856,881	2,332,800	2,446,500	4.6%	$32,500	$16,386
Philadelphia CMSA [2]	5,899,345	2,855,100	2,997,600	4.8%	$35,797	$16,465
Pennsylvania	11,881,643	5,583,000	5,901,000	5.4%	$29,069	$14,068
United States	248,709,873	125,182,378	191,829,271	5.5%	$30,056	$14,420

Sources: U.S. Census Bureau (1990 Census), Pennsylvania Department of Labor and Industry. (5-County Totals computed.)

[1] In 1990, the above five Pennsylvania counties plus Burlington, Camden and Gloucester County in New Jersey.

[2] In 1990, the Philadelphia PA-NJ PMSA, Trenton NJ and Vineland-Millville-Bridgeton NJ PMSAs, Wilmington DE-NJ-MD PMSA.

23 Montgomery County Intermediate Unit

	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
23 Montg	3					
		3 + 1				
			15 + 3			

Phase	School District
3	Abington School District
	Bryn Athyn School District
3	Cheltenham Township School District
3	Colonial School District
1	Hatboro-Horsham School District
2	School District of Jenkintown
3	Lower Merion School District
3	Lower Moreland Township School District
3	Methacton School District (North AVTS)
1	Norristown Area School District
3	North Penn School District (North AVTS)
3	Perkiomen Valley School District (North AVTS)
3	Pottsgrove School District
3	Pottstown School District
3	Souderton Area School District (North AVTS)
3	Spring-Ford Area School District
1	School District of Springfield Township
2	School District of Upper Dublin
3	Upper Dublin School District
2	Upper Merion Area School District
3	Upper Moreland Township School District
3	Upper Perkiomen School District
3	Wissahickon School District (North AVTS)
3	Central Montgomery County Area Vocational-Technical Sch
3	Eastern Montgomery County Area Vocational-Technical Sch
3	North Montgomery County Area Vocational-Technical Sch
2	Western Montgomery County Area Vocational-Technical Sch

INTEGRATED CORE AND OCCUPATIONAL SKILLS

	Year 1	Year 2	Year 3	Year 4	Year 5
	Detail Plan	Plan Implementation			Eval of Outcome

North Montco Tech

Methacton SD
- Methacton HS
- Arcola IS

North Penn SD
- North Penn HS
- North Penn JHS
- Pennbrook MS
- Pennfield MS
- Gwyn-Nor ES
- Hatfield ES
- Inglewood ES
- Knapp ES
- A.M. Kulp ES
- Montgomery ES
- Nash ES
- North Wales ES
- Oak Park ES
- York Ave ES
- Gwynedd Square ES

Perkiomen Valley SD
- Perk Valley HS
- Perk Valley MS

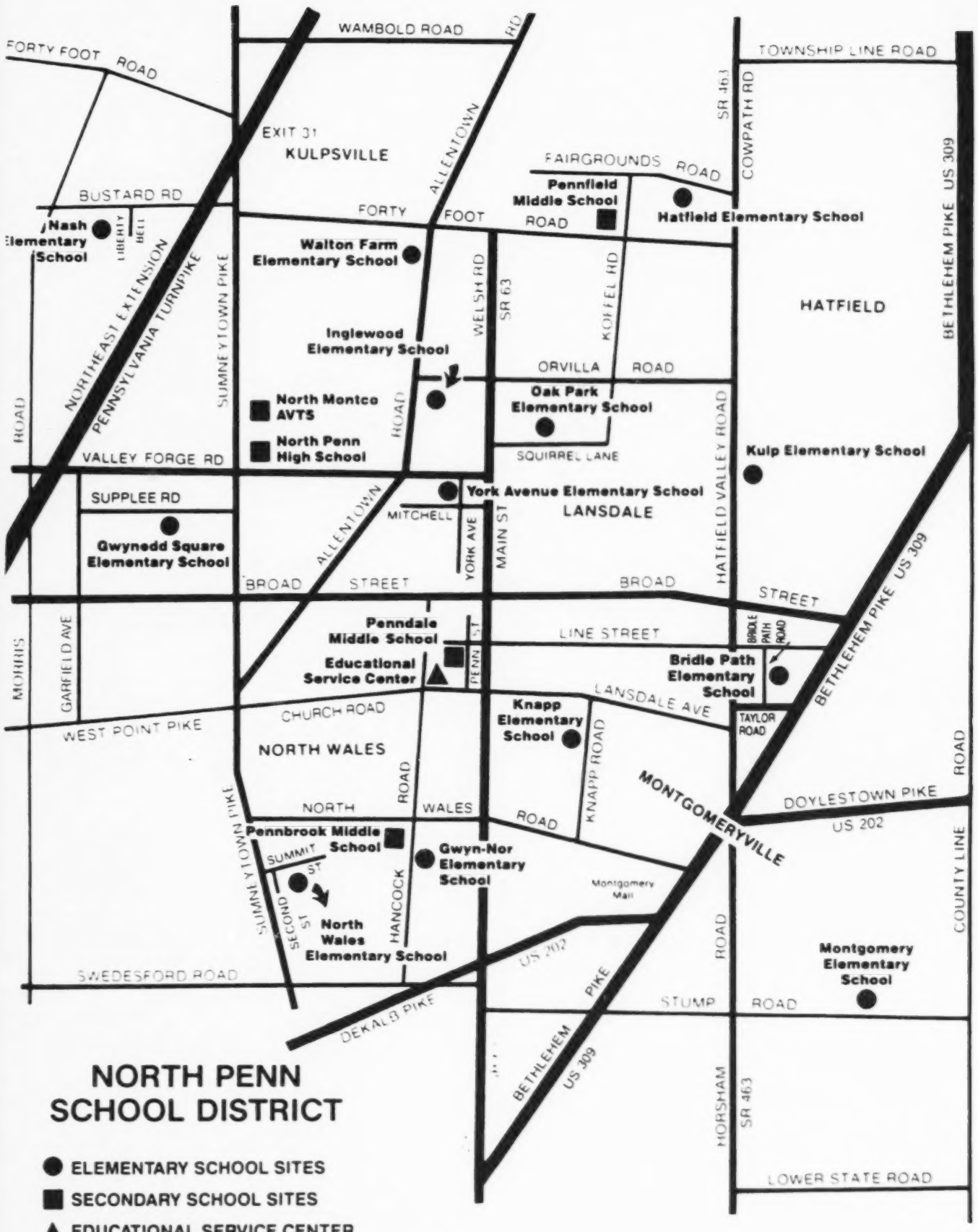
Souderton SD
- Souderton Area HS
- Indian Crest MS
- Indian Valley MS

Wissahickon SD
- Wissachickon HS
- Wissahickon MS

Montg Co CC

Penn State O.

Key:
SD - School District
HS - High School
IS - Intermediate School
MS - Middle School
ES - Elementary School
CC - Community College



NORTH PENN SCHOOL DISTRICT

- ● ELEMENTARY SCHOOL SITES
- ■ SECONDARY SCHOOL SITES
- ▲ EDUCATIONAL SERVICE CENTER

Church Road at Hancock Street
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215-368-0400 FAX 215-368-3161

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NORTHERN MONTGOMERY COUNTY TECHNICAL CAREER CENTER

BUILDING TRADES TECHNOLOGY

Building Trades Technology
Construction Carpentry Technology
HVAC and Refrigeration Technology
Trowel Trades Technology

CULINARY ARTS TECHNOLOGY

Baking and Management Technology
Food Preparation and Management Technology

ENGINEERING TECHNOLOGY

Engineering Technology
Industrial Electrical Technology

HEALTH AND HUMAN SERVICES TECHNOLOGY

Cosmetology Technology
Health Occupations Technology

METAL TRADES TECHNOLOGY

Machine Trades Technology
Welding and FabricationTechnology
Drafting and Design Technology
(Architectural Drafting Students will rotate through the Building Trades Cluster)
(Mechanical Drafting Students will rotate through the Metal Trades Cluster)

POWER AND TRANSPORTATION TECHNOLOGY

Auto and Truck Collision Repair Technology
Automotive Technology I
Automotive Technology II
Heavy Equipment Technology
Outdoor Power Equipment Technology

VISUAL COMMUNICATIONS TECHNOLOGY

Commercial Art Technology
Graphic Arts Technology

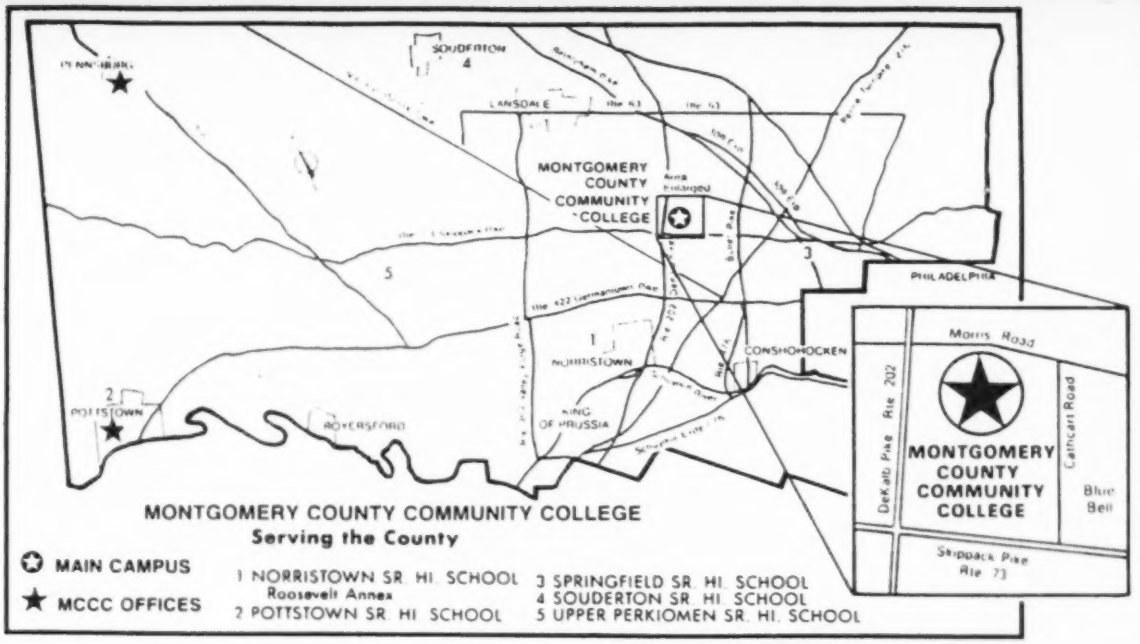
revised 6/22/94

COMMERCIAL ART TECHNOLOGY
DUTY AND TASK LIST

DUTY A	ORIENTATION
A-1	Define the role of Commercial Art in business community
A-2	Identify major occupations in Commercial Art
A-3	Identify Commercial Art processes
A-4	Shop and lab safety
A-5	Importance of good attendance/punctuality on the job
A-6	Appropriate school/classroom rules
A-7	Impact of changing technology in Commercial Art
A-8	Utilize effective work habits with new tasks
A-9	Identify and apply standards of performance or quality of work
DUTY B	**PROBLEM SOLVING SKILLS**
B-1	Basic equipment and hand tools for layout and paste-up
B-2	Basic materials and supplies for layout and paste-up
B-3	Understanding job objectives
B-4	Understanding job specifications
B-5	Understanding measurements and directions (vertical/horizontal)
B-6	Understanding pica measurements
B-7	Understanding and demonstrating various creative solutions
B-8	Thumbnail techniques/ideas
B-9	Layout and design
B-10	Propose a finished solution (finish comprehensive layout)
DUTY C	**TYPOGRAPHY**
C-1	Identify type styles
C-2	Select typefaces
C-3	Specify type styles
C-4	Identify and differentiate serif type and sans serif type styles
C-6	Identify different type formats

GRAPHIC ARTS TECHNOLOGY
PIA DUTY AND TASK LIST

DUTY A	INTRODUCTION
A-1	Define the role of graphics in the free enterprise systems
A-2	Identify printing markets & types of printing business
A-3	List printing's ranking among other industries
A-4	Identify the major printing processes
A-5	List the advantages of each major process
A-6	List the disadvantages of each major process
A-7	Identify the products produced by each major process
A-8	List in order the business flow of printing from initial need to final product
A-9	List in order the technical production flow from idea to finished product
A-10	Identify major occupations in the graphic arts
A-11	List the major responsibilities for each occupation
A-12	Identify basic salary wage expectation ranges for local area
DUTY B	**ART & COPY PREPARATION**
B-1	Identify basic equipment and hand tools for paste-up
B-2	Identify basic materials and supplies for paste-up
B-3	Produce a simple paste-up using the correct procedures, equipment, tools & materials
DUTY C	**ELECTRONIC IMAGING**
C-1	Choose type using correct size and format
C-2	Identify fundamentals of type and its uses
C-3	Identify the various kinds of items that can be designed and produced using desktop publishing
C-4	Demonstrate a keyboard typing proficiency of 30 to 40 W.P.M.
C-5	Organize a file management system for opening, copying, saving and deleting files
C-6	Demonstrate a file management systems for opening, copying, saving and deleting files



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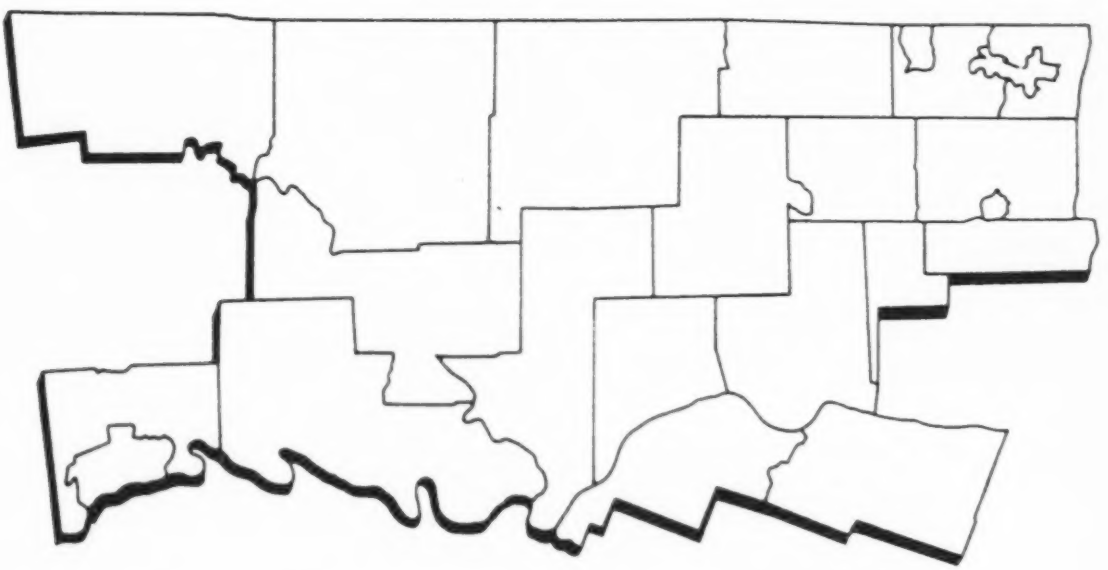

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"THIRD WAVE" TRANSFORMATIONAL LEADERS

Creating Solution Based Learning focused on Math, Science, and Technology

in the Era of Smart Homes,
Wired Communities, Fast Systems, Global Networks,
and Fast Forward Leaders in a Borderless World

by

Warren H. Groff
Consultant and National Lecturer
Nova Southeastern University

Industrial Arts Institute
National Taiwan Normal University
May 23, 1994

” 第三波 ”

轉型期的領導者

以創意解決爲基礎的學習
著重於數學、科學與技術

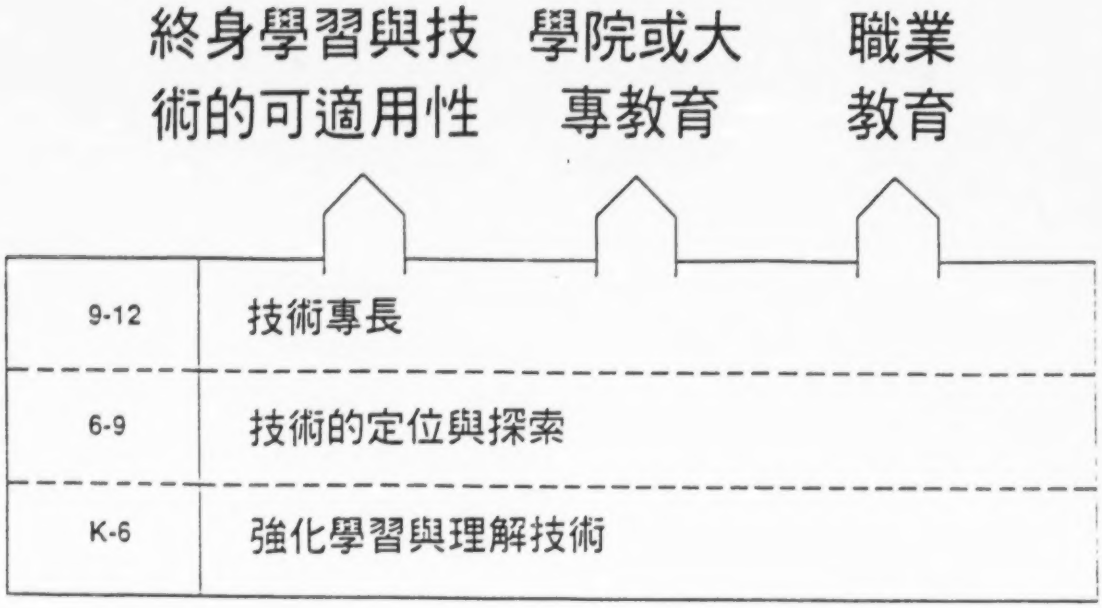
"THIRD WAVE"

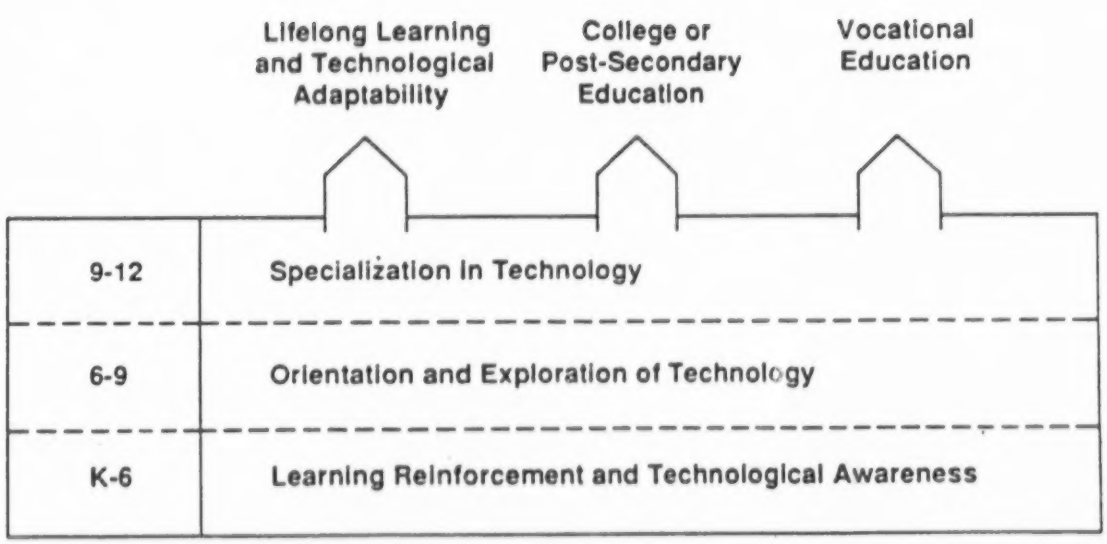
TRANSFORMATIONAL LEADERS:

CREATING SOLUTION BASED

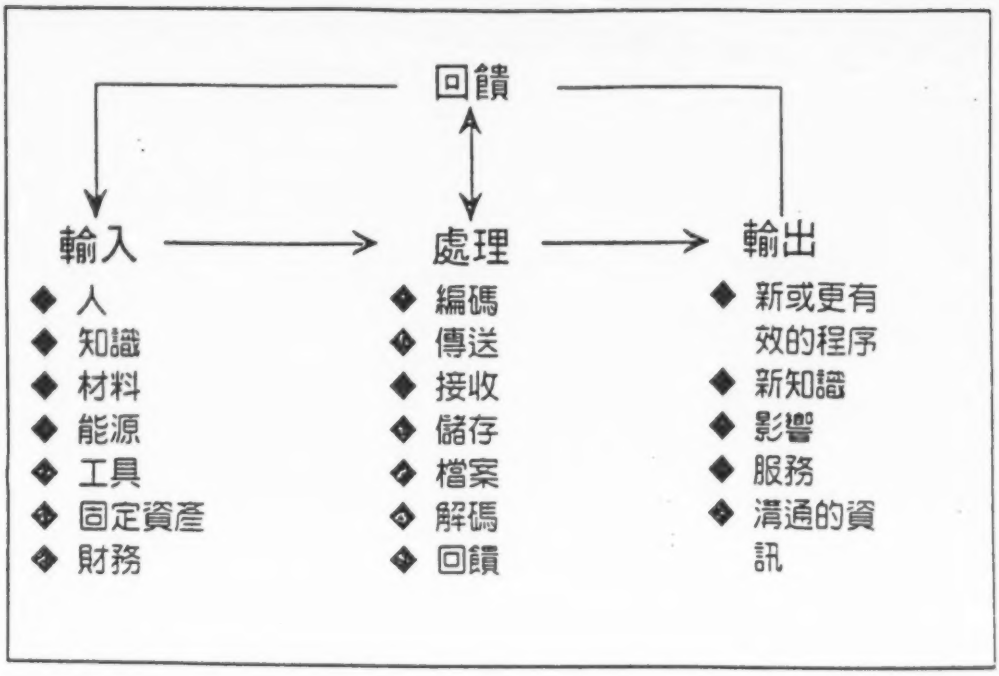
LEARNING FOCUSED ON

MATH, SCIENCE, AND TECHNOLOGY

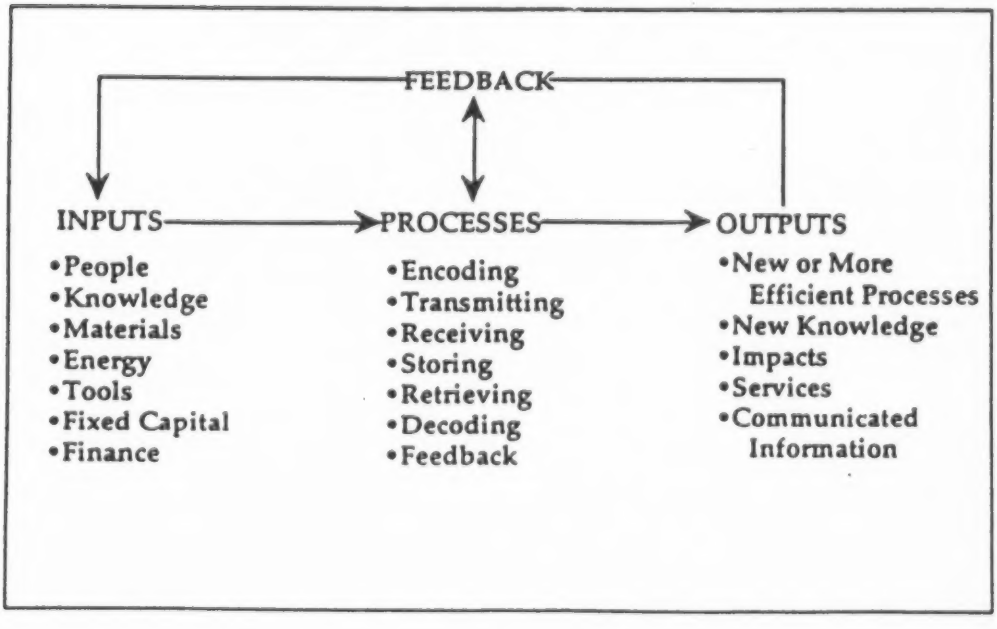

終身學習與技術的可適用性
學院或大專教育
職業教育
9-12
技術專長
6-9
技術的定位與探索
K-6
強化學習與理解技術


Lifelong Learning and Technological Adaptability
College or Post-Secondary Education
Vocational Education
9-12
Specialization in Technology
6-9
Orientation and Exploration of Technology
K-6
Learning Reinforcement and Technological Awareness

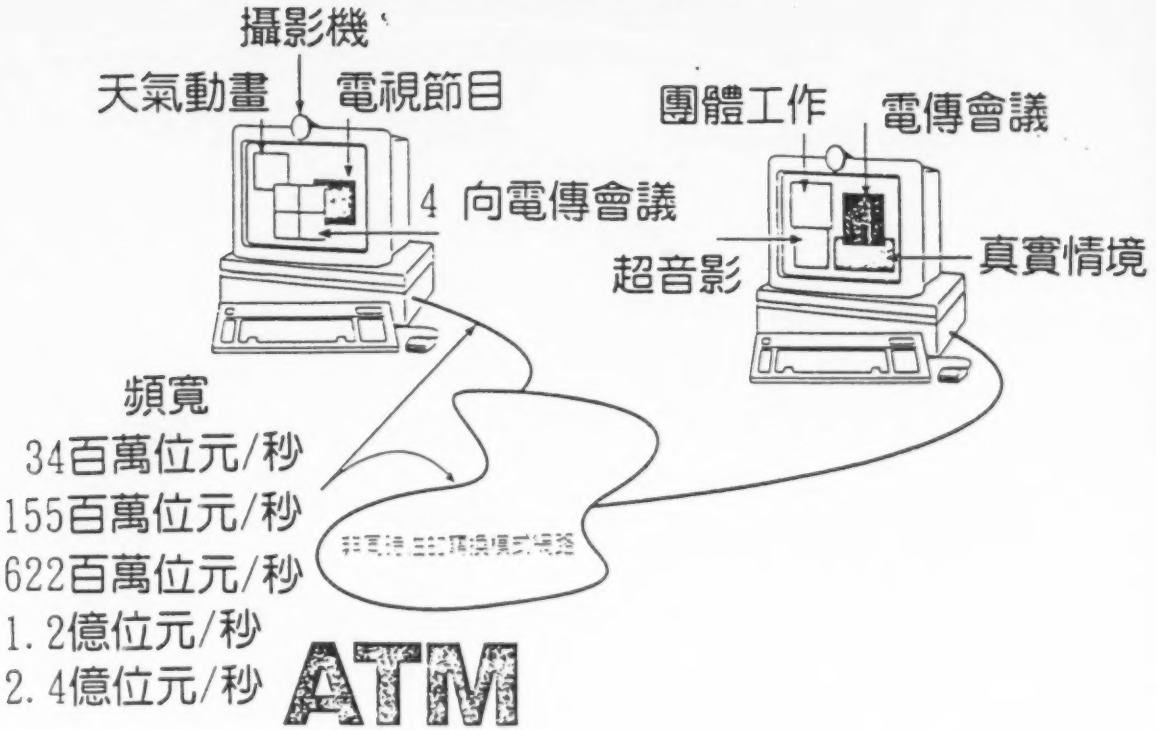
溝通系統



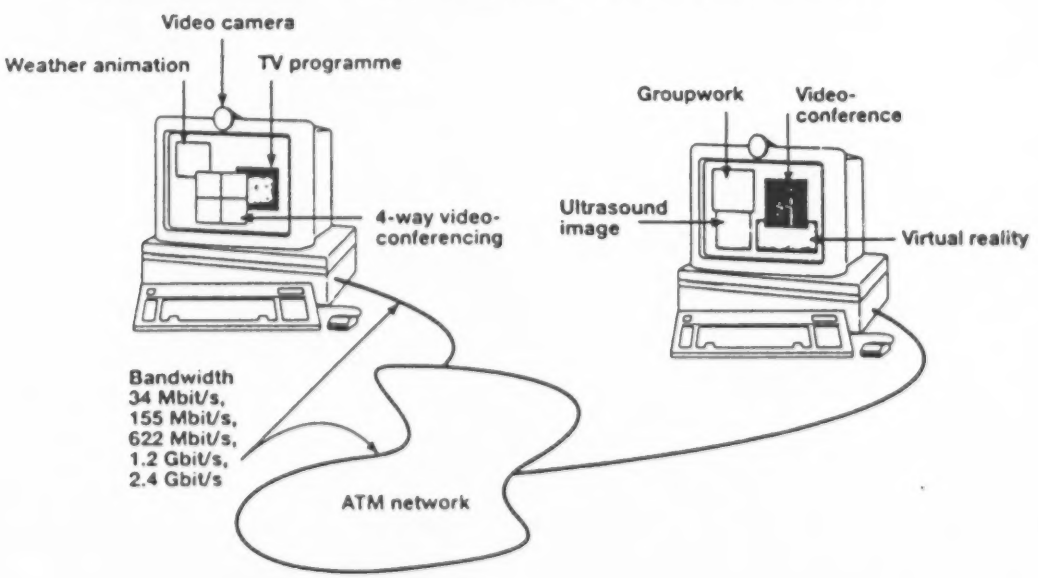
THE COMMUNICATION SYSTEM



寬頻應用環境

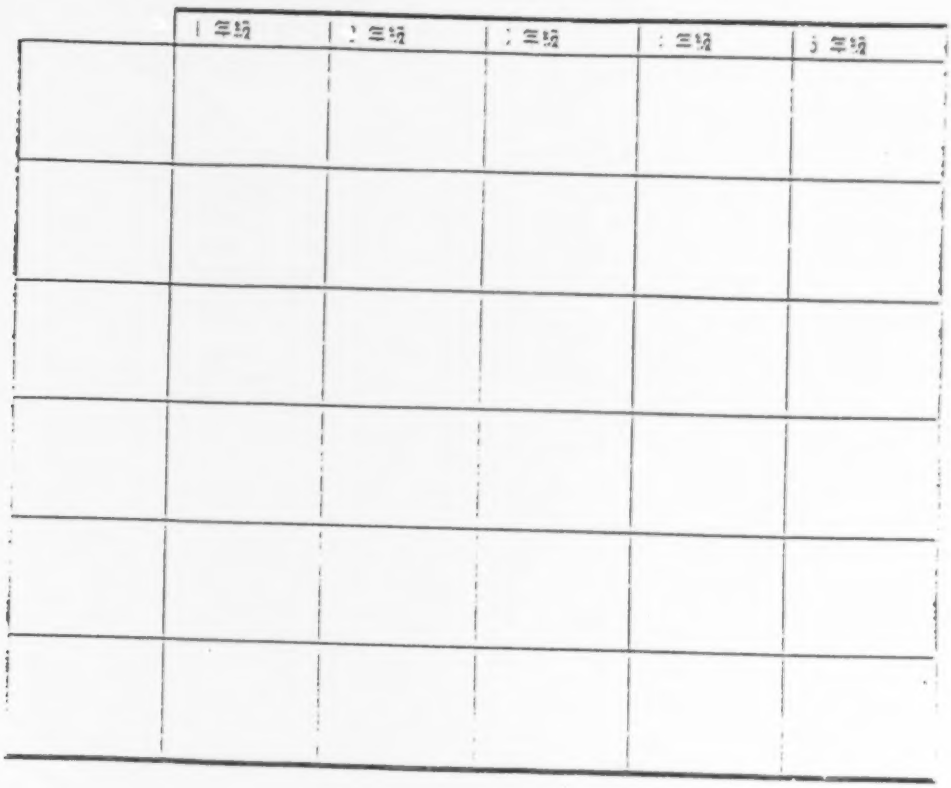


BROADBAND APPLICATION ENVIRONMENT



ATM

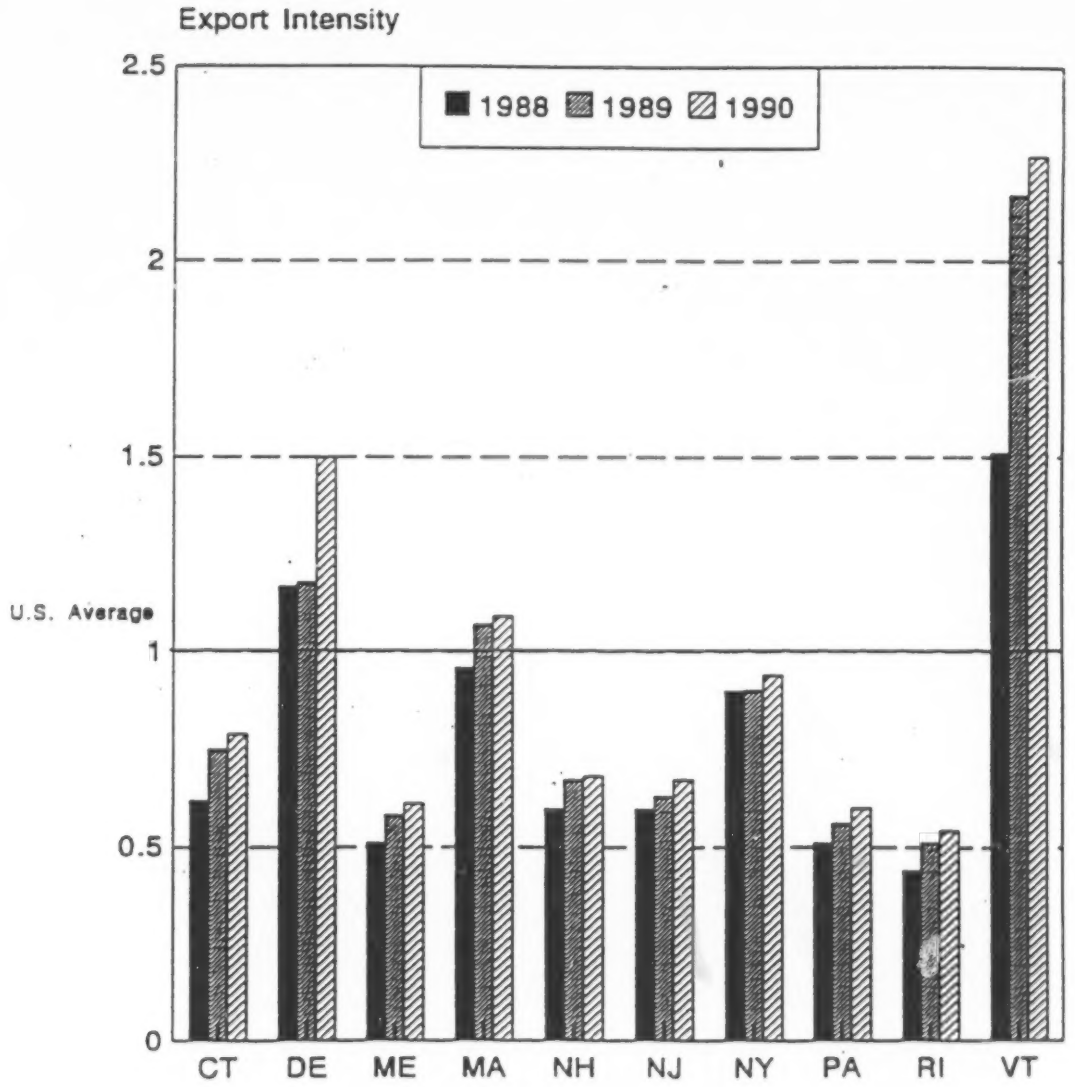
多年計畫



MULTI-YEAR PLAN

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5

Chart 2.3C
Overall Export Intensity
Northeastern States, 1989-90



Calculated by the Urban Institute using data provided by MISER and US Dept. of Commerce, Bureau of Economic Analysis